

The opinion in support of the decision being
entered today is not binding precedent of the Board.

Paper No. 110

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

VLADIMIR M. ZAKOSHANSKY
Junior Party
(U.S. Application 08/545,092),

v.

RICHARD R. HERTZOG, STYLIANOS SIFNIADES
AND WILLIAM B. FISHER
Senior Party,
(U.S. Application 09/865,190).

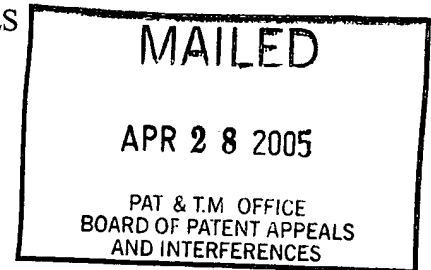
Patent Interference No. 104,831

Before: SPIEGEL, GARDNER LANE and TIERNEY, Administrative Patent Judges.
TIERNEY, Administrative Patent Judge.¹

DECISION - Preliminary Motions - Bd.R. 125(a)

This interference is before a motions panel for a decision on preliminary motions
following oral argument.

¹As part of Board efforts under the Government Paperwork Elimination Act, signatures on papers originating from the Board are being phased out in favor of a completely electronic record. Consequently, this and subsequent papers in this case originating at the Board will not have signatures. The signature requirements for the parties have not changed. *See, e.g.*, 37 C.F.R. § 10.18



I. Summary of Decision

This interference is directed to processes for decomposing cumene hydroperoxide (CHP) into phenol and acetone using acidic catalysts and compositions used therein. Of note, both parties claim processes that seek to improve the yield of alpha methylstyrene (“AMS” or “α-MS”), a valuable by-product of the CHP decomposition process.

The parties have filed fifteen (15) preliminary motions for our consideration. Each party has filed unpatentability motions against its opponent; motions to add or amend claims; motions to substitute new counts for the present counts; and motions seeking earlier priority benefit for the proposed counts. Additionally, Hertzog has filed a miscellaneous motion to strike certain Zakoshansky evidence and/or replies.

To understand the nature of the interfering subject matter between the parties, we begin our review of the motions by analyzing the patentability of the parties’ claims. Zakoshansky filed four (4) preliminary motions alleging that Hertzog’s involved claims are unpatentable. Zakoshansky Preliminary Motions 1 and 3 allege that Hertzog’s claims are unpatentable over prior art. Zakoshansky Preliminary Motion 2 alleges that Hertzog’s specification fails to provide sufficient written descriptive support for the claimed subject matter and Zakoshansky Preliminary Motion 4 alleges a lack of sufficient enablement.

Our review and consideration of Zakoshansky’s unpatentability preliminary motions revealed that most, but not all, of Hertzog’s involved claims as well as certain Zakoshansky claims are unpatentable over the prior art cited in Zakoshansky Preliminary Motions 1 and 3. Additionally, while several Hertzog claims are unpatentable for a lack of sufficient written

descriptive support, Zakoshansky has not meet its burden of demonstrating that one skilled in the art armed with Hertzog's specification could not make and/or use Hertzog's claimed subject matter.

Hertzog Preliminary Motions 1 and 2 allege that Zakoshansky's claims are unpatentable as anticipated by and/or obvious over certain Zakoshansky Soviet Author Certificates that are available against Zakoshansky under 35 U.S.C. §102(d). A dispute arose as to whether or not section 102(d) references could be used in an obviousness context. To determine whether section 102(d) is available for consideration as prior art under section 103 we analyzed the language of sections 102(d) and 103, their legislative histories and the opinions of the Federal Circuit, the Court of Claims and Patent Appeals (CCPA) and the Board of Patent Appeals and Interferences (BPAI). Based upon our analysis we concluded that section 102(d) is a loss of right section and, as with loss of right section 102(b), section 102(d) is available for consideration under section 103. Comparing the Author Certificates and Zakoshansky's involved claims in light of the evidence presented by the parties, we conclude that Hertzog has met its burden of demonstrating that certain Zakoshansky claims are unpatentable as anticipated by and/or obvious.

Hertzog Preliminary Motion 3 alleges that Zakoshansky failed to provide the best mode of carrying out his claimed subject matter. Hertzog, however, fails to demonstrate that Zakoshansky possessed an unrecited best mode of carrying out the claimed invention at the time Zakoshansky's U.S. application was filed.

Generally, an interference exists where there is a question of priority as between two parties claiming the same patentable subject matter such that two patents on the claimed subject

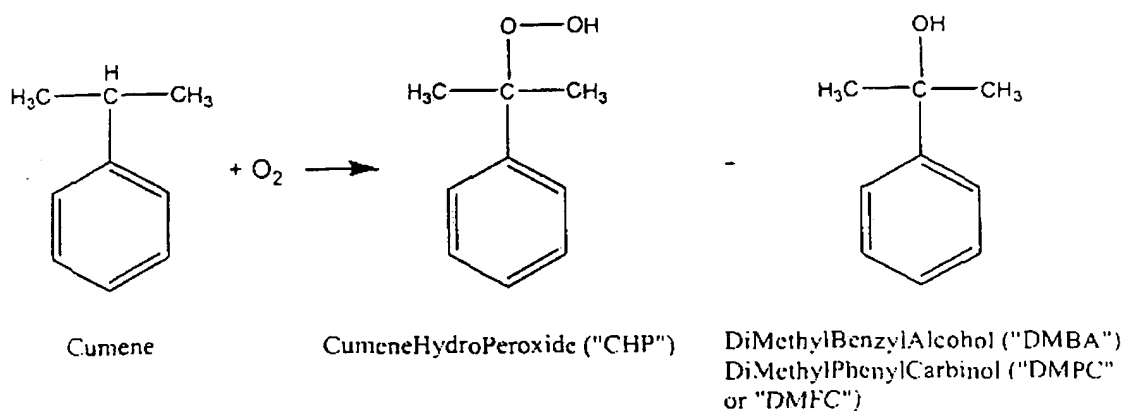
matter should not exist. Our analysis of the parties' unpatentability motions demonstrates that most of Hertzog's claims are unpatentable as are many of Zakoshansky's. As the record fails to demonstrate that the parties' remaining claims are directed to the same patentable subject matter, it is appropriate to terminate the interference with a judgment of no interference-in-fact between the parties. A judgment terminating the interference on the basis of no interference-in-fact between the parties remaining claims accompanies this decision.

The parties remaining preliminary motions to substitute the counts and requests for benefit of the substituted counts are moot as there is no longer interfering subject matter as between the parties. Finally, Hertzog's miscellaneous motion to strike certain Zakoshansky evidence and/or replies is denied-in-part and moot-in-part.

II. The Technology in Question

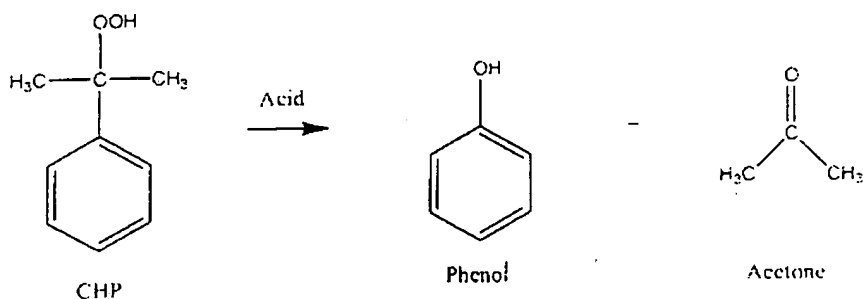
Zakoshansky has provided a detailed discussion of the technology involved in this interference. (Zak. Prel. Mot. 1, Paper No. 46, ¶ 1; Hertzog Opp. 1, Paper No. 60, admitting the factual explanation of involved reactions). As stated by Zakoshansky, the technology involved in this interference relates to a three-part process for synthesizing phenol, acetone and AMS. Zakoshansky's description and depictions of the reactions is provided below:

a. ***Part One: Oxidation of cumene to produce "technical cumene hydroperoxide" ("technical CHP").*** The technical CHP produced by this cumene oxidation process contains CHP, dimethylbenzylalcohol ("DMBA") (which is also known as dimethylphenylcarbinol ("DMFC" or DMPC")), acetophenone, unreacted cumene, and byproducts. The principal reaction - the oxidation of cumene to form CHP and DMBA - is as follows:

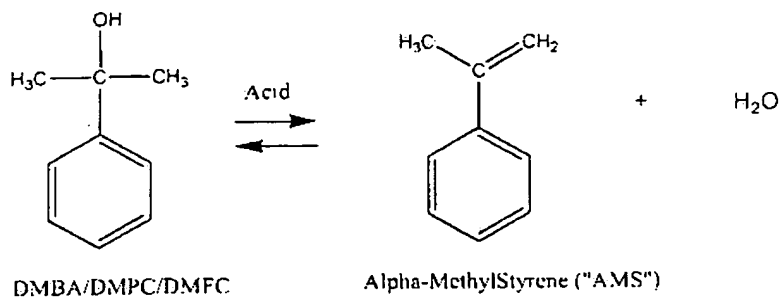


b. ***Part Two: Decomposition of the technical CHP to produce phenol, acetone, alpha-methylstyrene ("AMS") and dicumylperoxide ("DCP").*** In this step, CHP undergoes cleavage to form phenol and acetone. CHP also condenses with DMBA to form DCP and water. And DMBA undergoes dehydration to form AMS, water and byproducts. (AMS is useful in its own right. It can also be reconverted back to cumene, the original starting material, by hydrogenation.) The principal reactions are as follows:

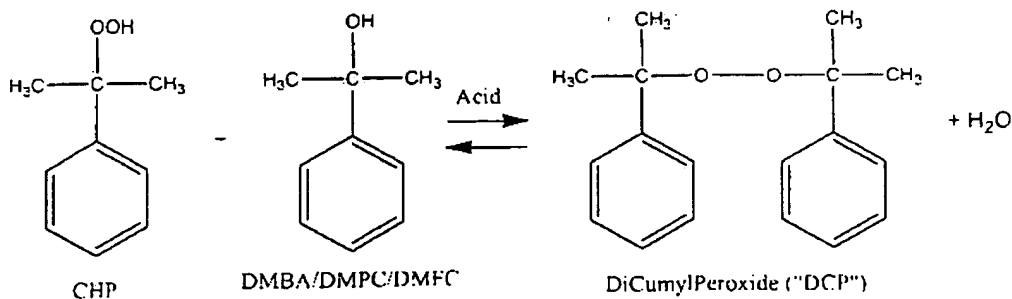
Cleavage of CHP to Phenol and Acetone:



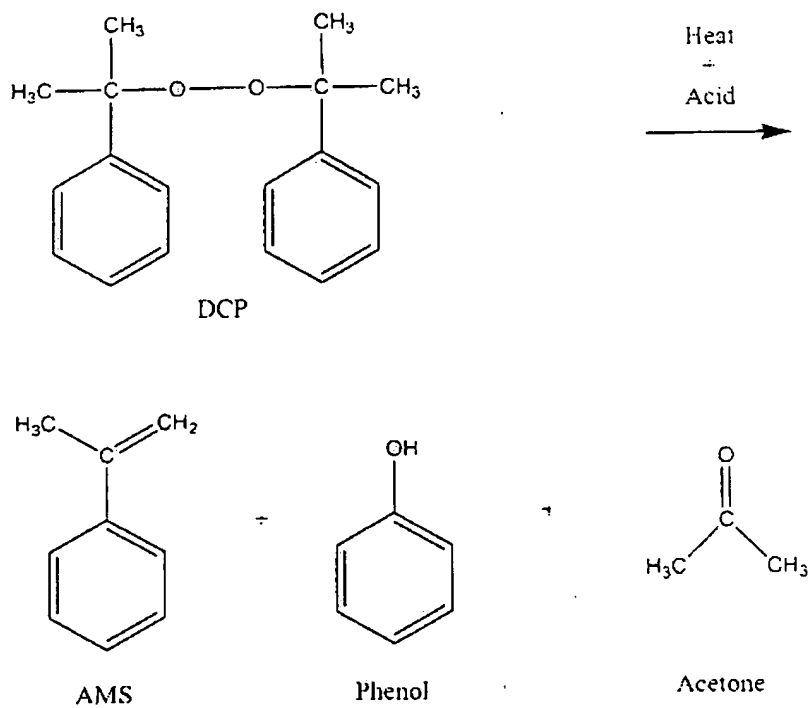
Dehydration of DMBA to AMS:



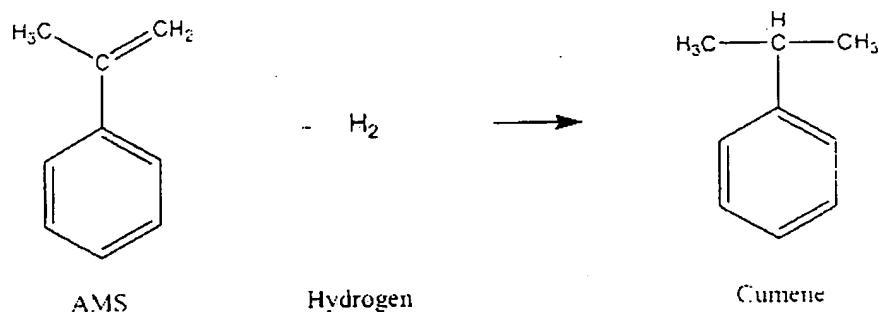
Condensation of CHP and DMBA to form DCP:



c. ***Part Three: Decomposition of DCP to produce AMS, phenol, acetone and byproducts.*** In this part, the DCP produced in Part Two is decomposed at a higher temperature to form AMS, phenol and acetone. The principal reaction is as follows:



d. ***Miscellaneous***: The hydrogenation reaction by which AMS is reconverted into the cumene starting material is as follows:



(Paper No. 46, ¶ 1, emphasis in original).

III. Findings of Fact

The record supports, by a preponderance of the evidence, the following findings:

A. Real Parties in Interest

1. Junior Party

1. All right, title and interest in the involved Zakoshansky U.S. Application 08/545,092 (“‘092 application”) is said to be held jointly by General Electric Company and Illa International Ltd. (Zakoshansky Real Party in Interest, Paper No. 11).

2. Senior Party

2. Sunoco Inc., (R&M) is said to be the real party in interest in the involved Hertzog U.S.

Application 09/865,190 (“‘190 application”). (Hertzog Identification of Party in Interest, Paper No. 8).

B. Accorded Priority Benefit

1. Junior Party

3. Zakoshansky’s involved ‘092 application was filed on October 19, 1995 and is a reissue of U.S. Patent No. 5,254,751. (Notice Declaring Interference, Paper No. 1, p. 3). Solely for the purpose of priority, Zakoshansky’s ‘092 application has been accorded the benefit of the filing date of:

- 1) U.S. Patent No. 5,254,751, issued on October 19, 1993 based upon U.S. Application No. 07/944,688, filed September 14, 1992.

(*Id.*)

2. Senior Party

4. Hertzog’s involved ‘190 application was filed on July 23, 2001. Solely for the purpose of priority, Hertzog’s ‘190 application has been accorded the benefit of the filing dates of:

- 1) U.S. Application No. 08/601,879, filed February 15, 1996;
- 2) U.S. Application No. 08/333,929, filed November 3, 1994;
- 3) U.S. Application No. 08/203,845, filed February 28, 1994;
- 4) U.S. Application No. 07/920,811, filed July 24, 1992; and,
- 5) U.S. Application No. 07/297,333, filed January 17, 1989.

(*Id.* at 4).

C. The Count and Claim Correspondence

5. There are three (3) counts in this interference.

6. The claims of the parties are:

Hertzog, U.S. Application 09/865,190: 7-43
Zakoshansky, U.S. Application 08/545,092: 1-31 and 33-41

(*Id.* at 6, and Zakoshansky Amendment, Paper No. 27, adding new claims 40 and 41²).

i. Count 1.

7. Count 1 reads as follows:

A method according to claims 1, 2, 3, 4, 10, 11, 16, 27, 28, 33, 37 and 39 of U.S. Application 08/545,092.

or

A method according to claims 7, 11, 14, 17, 25, 26, 29, 31, 32, 33, 36 and 43 of U.S. Application 09/865,190.

(Paper No. 1 at 5).

8. Hertzog '190 claim 7 is an alternative of Count 1 and reads as follows:

7. An improved method for the decomposition of cumene hydroperoxide by acidic catalyst to phenol and acetone wherein the improvement comprises decomposing cumene hydroperoxide in a continuous manner in a decomposition reactor using sulfuric acid as the acidic catalyst in the presence of cumene and excess acetone whereby the reactor composition includes 10 to 100 percent excess acetone relative to the amount of acetone produced during the reaction whereby the rate of decomposition of cumene hydroperoxide is reduced and the reaction is more controllable and more selective.

²The amendment adding claims 40 and 41 was authorized by an APJ in Paper No. 23.

(Hertzog Copy of Claims, Paper No. 13).

9. Zakoshansky '092 application claim 7 is an alternative of Count 1 and reads as follows:

1. An improved method for the decomposition of cumene hydroperoxide by acidic catalyst to phenol and acetone wherein the improvement comprises decomposing cumene hydroperoxide in a continuous non-isothermal manner in a decomposition reactor using sulfuric acid as the acidic catalyst in the presence of cumene in an amount of about 10 to 18 weight percent of the reactor composition and excess acetone whereby the molar ratio of acetone to phenol in the reactor composition is from about 1.1:1 to 1.5:1 whereby the rate of decomposition of cumene hydroperoxide is reduced and the reaction is more controllable and more selective.

(Zakoshansky Appendix of Claims, Paper No. 105).

10. The claims of the parties which correspond to Count 1 are:

Hertzog, U.S. Application 09/865,190: 7-26, 29-38 and 43
Zakoshansky, U.S. Application 08/545,092: 1-20, 27-31, 33-37, and 39-41

(Paper No. 1, p. 6 and Paper No. 27, p. 1).

11. The claims of the parties which **do not** correspond to Count 1 are:

Hertzog, U.S. Application 09/865,190: 27-28 and 39-42
Zakoshansky, U.S. Application 08/545,092: 21-26 and 38

(*Id.*).

ii. Count 2

12. Count 2 reads as follows:

A composition according to claims 21 and 22 of U.S. Application 08/545,092.

or

A composition according to claim 27 of U.S. Application 09/865,190.

(*Id.* at 5).

13. Hertzog '190 claim 27 is an alternative of Count 2 and reads as follows:

27. A composition comprising cumene hydroperoxide, cumene, acidic catalyst for decomposition of cumene hydroperoxide, dicumyl peroxide, dimethylbenzyl alcohol, phenol, and acetone wherein the acetone is in a molar ratio to phenol in excess of 1.

(Paper No. 13).

14. Zakoshansky '092 application claim 22 is an alternative of Count 2 and reads as follows:

22. A composition comprising cumene, acidic catalyst for decomposing cumene hydroperoxide, dicumyl peroxide, water, phenol, acetone and a reaction product of (1) an amine with (2) an acid which catalyzes the decomposition of cumene hydroperoxide, wherein the acetone is in a molar ratio to phenol of from 1.1.5:1 to 1.4:1.

(Zakoshansky Appendix of Claims, Paper No. 105).

15. The claims of the parties which correspond to Count 2 are:

Hertzog, U.S. Application 09/865,190: 27 and 28
Zakoshansky, U.S. Application 08/545,092: 21-26

(Paper No. 1, p. 6).

16. The claims of the parties which **do not** correspond to Count 2 are:

Hertzog, U.S. Application 09/865,190: 7-26 and 29-43
Zakoshansky, U.S. Application 08/545,092: 1-20, 27-31, 33-41

(Paper No. 1, p. 6 and Paper No. 27, p. 1).

iii. Count 3

17. Count 3 reads as follows:

A composition according to claim 38 of U.S. Application 08/545,092.

or

A composition according to claim 39 of U.S. Application 09/865,190.

(Paper No. 1, p. 5).

18. Hertzog '190 claim 39 is an alternative of Count 3 and reads as follows:

39. A cumene hydroperoxide decomposition mass produced from the reaction of cumene hydroperoxide with an acid catalyst, wherein the acid catalyst is sulfuric acid, in a continuous manner having 10 to 100 percent excess acetone relative to the amount of acetone produced during the reaction and cumene.

(Paper No. 13).

19. Zakoshansky '092 claim 38 is an alternative of Count 3 and reads as follows:

38. A cumene hydroperoxide decomposition mass produced from the reaction of cumene hydroperoxide with an acid catalyst, wherein the acid catalyst is sulfuric acid, in a continuous non-isothermal manner having an acetone to phenol mole ratio of about 1.1 to 1 to 1.5 to 1 and cumene in an amount of about 10 to 18 weight percent of the decomposition mass.

(Zakoshansky Appendix of Claims, Paper No. 105).

20. The claims of the parties which correspond to Count 3 are:

Hertzog, U.S. Application 09/865,190: 39-42

Zakoshansky, U.S. Application 08/545,092: 38

(Paper No. 1, p. 6).

21. The claims of the parties which do not correspond to Count 3 are:

Hertzog, U.S. Application 09/865,190: 7-38 and 43

Zakoshansky, U.S. Application 08/545,092: 1-31, 32-37 and 39-41

(Paper No. 1, p. 6 and Paper No. 27, p. 1).

E. Person of Ordinary Skill in the Art

22. A person of ordinary skill in the art would possess a Bachelor's degree in chemistry or chemical engineering and several years of experience with the cumene-to-phenol process in a plant operating environment. (See, Declaration of John W. Fulmer, ZX 2001, ¶ 96).

F. Prior Art

1. Sifniades,³ U.S. Patent 4,358,618 (ZX 2006)

23. Sifniades issued on November 9, 1982. Zakoshansky claims 35 U.S.C. §120 benefit of an application, 07/944,688 filed September 14, 1992 and Hertzog claims 35 U.S.C. §120 benefit of an application, 07/297,333, filed January 17, 1989. As Sifniades issued more than a year before the earliest alleged effective filing dates of Hertzog and Zakoshansky, Sifniades is available as prior art against both parties under 35 U.S.C. §102(b).

³Sifniades is also a named inventor on the involved Hertzog '190 application.

24. Sifniades describes a CHP decomposition process whereby CHP and dimethylphenylcarbinol ("DMPC," also known as dimethylbenzylalcohol, "DMBA") are decomposed to produce phenol, acetone and AMS with reduced byproduct formation. (ZX 2006, col. 2, lines 19-24).

25. Sifniades describes the decomposition reaction ("the Sifniades process") as including the following steps:

(a) mixing the cumene oxidation product with an acid catalyst in a back-mix reactor in the presence of about 0.4 to about 4.5% water, by weight of reaction mixture, at a temperature between about 50° C. and about 90° C. for a time sufficient to lower the CHP concentration of the back-mix reaction mixture to between about 0.5 and about 5.0 weight % and to convert at least 40% of the DMPC in the cumene oxidation product to dicumylperoxide (DCP);

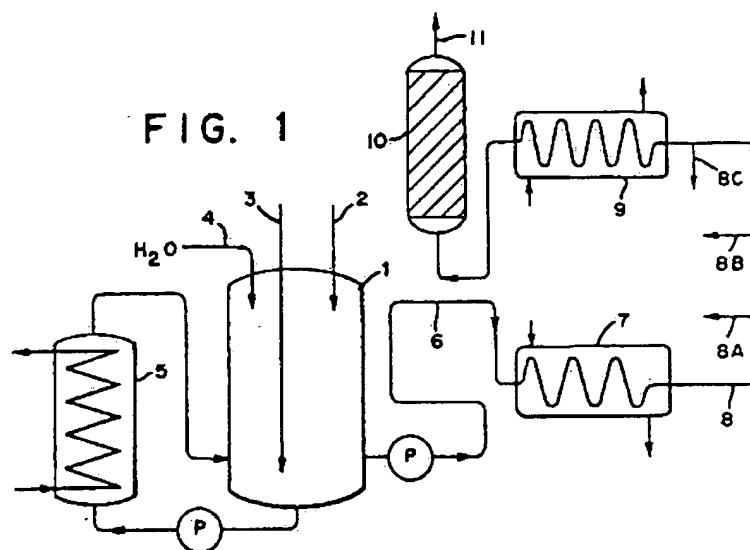
(b) reacting the back-mix reaction product at between about 50° C. and about 90° C. under plug flow conditions for a time sufficient to produce a second mixture having a CHP concentration no more than about 0.4%; and

(c) reacting the second reaction mixture, at a temperature between about 120° and about 150° C. under plug flow conditions for a time sufficient to convert at least 90% of the DCP to AMS, phenol and acetone.

(*Id.* at col. 2, lines 25-43).

26. Sulfuric acid may be used as the acid catalyst in step (a) of the Sifniades process. (*Id.* at col. 4, lines 34-36 and Examples 1-5).

27. Sifniades' Figure 1 is reproduced below and is illustrative of the Sifniades process.



28. In Sifniades Figure 1, reaction process step (a) is conducted in backmix reactor 1 with technical CHP, acid catalyst and water introduced into the reaction via inlets 2, 3 and 4 respectively. (*Id.* at col. 5, lines 1-7).

29. The temperature of the backmix reactor 1 ranges from 50 to 90 °C, which "is maintained by means of circulation through cooler 5." (*Id.* at col. 5, lines 3-9).

30. The product from backmix reactor 1 is pumped through a tube 6 to heater 7 and contains 0.5 to 5% residual CHP. (*Id.* at col. 5, lines 22-30).

31. Step (b) of the Sifniades process is carried out in tube 6, which is designed to provide a residence time of between 0.1 to 10 minutes. (*Id.* at col. 5, lines 23-26).

32. According to Sifniades, the only significant reaction taking place in step (b) is the decomposition of the residual CHP and the “temperature in tube 6 is approximately the same as in backmix reactor 1.” (*Id.* at col. 5, lines 25-30).

33. From tube 6, the product passes through a heater 7 where the product is heated to a temperature of from 120°-150° C. (ZX 2006, col. 5, lines 30-32). The residence time in the heater 7 is “sufficient to cause decomposition of DCP and dehydration of DMPC to AMS as well as complete decomposition of any residual CHP.” (*Id.* at col. 5, lines 32-35).

34. The heated product is taken from heater 7 through pipe 8 to a cooler 9 where the reaction product is cooled to a temperature of from 30°-50° C. (*Id.* at col. 5, lines 30-32 and 43-44).

35. The cooled reaction product is sent from cooler 9 to an anion exchange resin bed, which neutralizes the acid catalyst. (*Id.* at col. 5, lines 44-46).

36. The neutralized product is distilled and the products recovered. (*Id.* at col. 5, lines 46-48).

37. Figure 1, lines **8A**, **8B** and **8C** represent sampling ports. (*Id.* at col. 5, lines 40-43).

2. Messina, *La Chimica E L'Industria*, V. 65, N.1, Gennaio 1983 (ZX 2007)

38. Messina was published in 1983 and is available as prior art against both parties under 35 U.S.C. §102(b). (ZX 2007, p. 10).

39. Messina describes the secondary products, i.e., by-products and impurities, in the conversion of cumene to phenol and acetone as having a major affect on the economy of the process. (*Id.*).

40. Messina states that:

Owing to the present heavy incidence of raw materials and energy on the cost of the final product, the knowledge both of the number and the nature of the secondary products and of their formation mechanism is very important, because it can help to improve the overall efficiency of the process.

(*Id.*).

41. Messina also states that:

As it will be seen, the amount of them [impurities and by-products] are mainly formed during the oxidation and acid cleavage, and, to a smaller extent, in the other steps of the process.

(*Id.*).

42. According to Messina:

It appears that because of the presence of DMFC in the process, the management of the acid decomposition reaction of CP [sic, CHP] must be such as to minimize the formation of dimers and cumyl phenols, and on the other hand, to dehydrate completely the carbinol.

Both the dehydration of DMFC and the side reactions of α -MS are catalyzed by acidity, which in turn is controlled by the basicity of the reaction medium (phenol/acetone ratio and concentration of water). Through a careful control of these parameters and temperature the aim to obtain the concentration maximum of α -MS can be reached.

(*Id.*, p. 12, footnotes omitted).

43. Messina teaches that the most important variable to control in the process is the phenol/acetone ratio (r), where low values of r provide the best buffer effect and the maximum preservation of α -MS. (*Id.*).

3. Levenspiel, Chemical Reaction Engineering, 2nd Ed., 1972 (ZX 2015)

44. Levenspiel published in 1972 and is available as prior art against Hertzog and Zakoshansky under 35 U.S.C. § 102(b). (ZX 2015).

45. Levenspiel provides a discussion relating to “three ideal reactors,” specifically, a batch reactor, a plug flow reactor and a backmix reactor. (*Id.*, p. 97).

46. Levenspiel identifies “ideal” backmix reactors as well-stirred and uniform throughout. (*Id.* at pp. 97-98).

47. Levenspiel also states that “we try to design real reactors such that their flows approach these ideals, and much of the development in this book centers about them.” (*Id.* at p. 98).

G. Expert Witness Qualifications

1. Zakoshansky’s Expert, John W. Fulmer

48. John Fulmer is a Principal Scientist - Phenol for the Plastics Division at General Electric. (ZX 2001, ¶ 1).

49. Mr. Fulmer states that he received a B.S. degree in Chemistry from the University of Missouri in 1963 and a Master of Science Degree in Chemistry from the University of Missouri in 1964. (*Id.* at ¶ 6).

50. Mr. Fulmer testifies that he has thirty-five (35) years of hands-on experience in research and the production of phenol, including the production of cumene for use in the cumene to phenol process. (*Id.* at ¶ 4).

51. Mr. Fulmer is qualified to testify as to the understanding of one of ordinary skill in the art at the relevant dates in this interference.

2. Hertzog's Experts

a. Alan B. Levy, Ph.D.

52. Alan Levy was awarded a Ph.D. in Organic Chemistry from the University of Colorado, Boulder, Colorado in 1971. (HX 1024, ¶ 2).

53. Dr. Levy has worked at Allied Signal for over twenty years and as part of his work was involved with various aspects of the phenol production process, including cumene hydroperoxide decomposition processes. (*Id.* at ¶¶ 4-5).

54. Dr. Levy opines that his work at Allied Signal in the field of cumene decomposition provided him with direct knowledge of the processes in use in the art of phenol production and chemistry involved in this interference from the early 1980's to the mid-1990's. (*Id.* at ¶ 5).

55. Dr. Levy is qualified to testify as to the understanding of one of ordinary skill in the art at the relevant dates in this interference.

b. Norman Gutzait

56. Mr. Gutzait testifies that he received a Bachelor of Science degree in Chemical Engineering from Drexel University in 1965. (HX 1023, ¶ 14).

57. Mr. Gutzait was employed by Allied Chemical Corp. and Allied Signal Corp. from 1965 until 1982. From 1965 to 1979 Mr. Gutzait worked at a phenol manufacturing facility in Philadelphia and was Manager of Operations. (HX 1023, ¶ 15).

58. From 1979 to present, Mr. Gutzait identifies continuous employment in the field of phenol technology including the construction, start-up and safe operation of state-of-the-art phenol plants. (HX 1023, ¶¶ 16-19).

59. Mr. Gutzait opines that his 37 years of experience in the field of phenol production provided him with direct knowledge about the state of the art in the field of phenol technology from 1960's until the present. (HX 1023, ¶ 20).

60. Mr. Gutzait is qualified to testify as to the understanding of one of ordinary skill in the art at the relevant dates in this interference.

H. Statements of Counsel Regarding Isothermal Versus Non-isothermal Processes

61. At oral argument, Hertzog's counsel was unable to identify an explicit numerical lower limit for determining whether a temperature gradient was isothermal or nonisothermal.

Specifically, Hertzog's counsel was questioned as follows:

Judge Tierney:	Do we have an indication for this specific process how much of a temperature gradient we need before we become non-isothermal?
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Mr. Koons: Your Honor, there is no set description or no set definition in the Hertzog application with respect to what a temperature gradient has to be to be non-isothermal.

Judge Gardner-Lane: Do we have testimony from an expert on how you would define that?

Mr. Koons: Not to my knowledge, Your Honor, we did not.

Judge Tierney: And the Zakoshansky specification wouldn't give that indication either, would it?

Mr. Koons: To my knowledge, it does not, Your Honor.

Judge Tierney: So there's no way in the record that we can actually split the hair and say one degree is isothermal but a two-degree temperature different [sic] is non-isothermal?

Mr. Koons: I believe there is not. And it's our position, again, that to the extent there is any temperature gradient, certainly any significant temperature gradient, that would be a non-isothermal reaction.

(Paper No. 107, 51:21 - 53:5).⁴

62. At oral argument, Zakoshansky's counsel defined the term "non-isothermal" on the basis of intent. Specifically:

Judge Tierney: Can you give me an explicit definition of non-isothermal for the record so we can all work with it?

⁴Both Hertzog (Paper No. 106) and Zakoshansky (Paper No. 107) filed copies of the hearing transcript along with proposed corrections. Hertzog objects to Zakoshansky's proposed changes at page 34, line 2, which alleges that Zakoshansky's counsel intended to say "the Zakoshansky" instead of "Sifniades, in the Hertzog." (Paper No. 108). Zakoshansky opposes this objection. (Paper No. 109). The objection is moot as we have not relied upon the portion of the transcript that is in dispute.

Mr. Woglom: In this case, non-isothermal, as used in the Zakoshansky's claims, refers to a system where temperature gradients are deliberately introduced for the purpose of adding controllability to the reaction as opposed to a situation such as shown in Sifniades or in Hertzog whereby just the nature of the world, you never have a perfect system where there's no change in temperature at all.

(Paper No. 107, 30:10-22).

IV. Opinion

In deciding the motions before us, a moving party bears the burden of proof by a preponderance of the evidence to show that it is entitled to the relief requested. 37 C.F.R. §1.637(a).^{5,6} The burden of showing something by a preponderance of the evidence simply requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence before the trier of fact may find in favor of the party who carries the burden. *Concrete Pipe & Products of California, Inc. v. Construction Laborers Pension Trust for Southern California*, 508 U.S. 602, 622, 113 S. Ct. 2264, 2279 (1993).

⁵A new set of rules for contested cases and interferences for the Board was placed into effect on September 13, 2004. 69 Fed. Reg. 49960 (12 August 2004), 1286 Official Gaz. 1286 (USPTO September 7, 2004). When a rule is changed during the pendency of a patent application, the rule in effect on the date of the patent issues is the one that should be applied to the patent. *Shockley v. Arcan, Inc.*, 248 F.3d 1349, 1358, 58 USPQ2d 1692, 1697 (Fed. Cir. 2001). Our decision on motions however, remains the same whether we apply the "old" rules or the "new" rules. As the parties motions requested relief under the old rules, we have addressed their concerns with respect to the old rules and provided footnotes, where appropriate, to the corresponding new rule. See *PerSeptive Biosystems, Inc. v. Pharmacia Biotech, Inc.*, 225 F.3d 1315, 1321 n.2, 56 USPQ2d 1001, 1005 n.2 (Fed. Cir. 2000) (applying the old rule to a patent issued under the old rule, but noting that the result would be the same under the new rule).

⁶See new rule 37 C.F.R. § 41.208(b), which places burden upon moving party.

A. Zakoshansky Preliminary Motions 1 and 3: Request that Hertzog's Claims Be Held Unpatentable Under 35 U.S.C. §§102(b) and 103

Zakoshansky alleges that all of Hertzog's involved claims are unpatentable. According to Zakoshansky, Hertzog's claims that do not copy any of Zakoshansky's distinguishing features are unpatentable over prior art. (Zak. Prel. Mot. 1, Paper No. 46). Zakoshansky alleges that Hertzog's claims that copy one or more of Zakoshansky's distinguishing features are unpatentable for lack of written description (Zak. Prel. Mot. 2, Paper No. 39) or, contingent upon a finding of written description, are unpatentable over the prior art. (Zak. Prel. Mot. 3, Paper No. 40). Additionally, Zakoshansky alleges that Hertzog claims 7-26, 29-35 and 43 are unpatentable for lack of an enabling disclosure. (Zak. Prel. Mot. 4, Paper No. 41). Hertzog opposes these motions.

We begin our analysis of Zakoshansky's patentability preliminary motions by construing Hertzog's involved claims.

1. Hertzog Claim Construction

In an interference, we give the language of the claims their broadest reasonable interpretation as they would be understood by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). A claim term should be given its ordinary meaning as it is understood in the art unless the specification provides a special, different meaning or definition. *ACTV, Inc. v. The Walt Disney Co.*, 346 F.3d 1082, 1090-91, 68 USPQ2d 1516, 1523 (Fed. Cir. 2003); *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366, 62 USPQ2d 1658,

1662-63 (Fed. Cir. 2002).

Reading the claim as a whole in light of a “whereby” clause can lead to different outcomes given different claims. For example, “[a] ‘whereby’ clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim.” *Israel v. Cresswell*, 166 F.2d 153, 156, 76 USPQ 594, 597 (CCPA 1948). In such cases, the reason that the “whereby” clause adds nothing is because its effect has been already achieved by other recited limitations. *See, e.g., Texas Instruments Inc. v. ITC*, 988 F.2d 1165, 1171, 26 USPQ2d 1018, 1023 (Fed. Cir. 1993) (“the ‘whereby’ clause in claim 12 . . . only express[ed] the necessary results of what is recited in the claims”). Yet, when a “whereby” clause is a positive limitation, it will be given effect. *See, e.g., Simpson v. Neracher*, 191 F.2d 416, 431-32, 91 USPQ 43, 56-7 (CCPA 1951). *See also Thermalloy Inc. v. Aavid Engineering, Inc.*, 121 F.3d 691, 694, 43 USPQ2d 1846, 1849 (Fed. Cir. 1997) (deleting a “whereby” clause impermissibly enlarged the scope of the reexamination claim).

Provided below is a discussion of the relevant disputed claim terms that appear in Hertzog’s claims and our construction thereof.

a. Non-isothermal

Zakoshansky Preliminary Motion 2 identifies Hertzog claims 8-10, 12-13, 15-16, 18-22, 25, 37-38 and 40-42 as directed to a CHP decomposition process or a product by process wherein the CHP decomposition is conducted in a non-isothermal manner. (Paper No. 41, ¶ 16). Zakoshansky and Hertzog disagree as to whether or not Hertzog’s process is isothermal or non-

isothermal.

Hertzog's '190 specification states:

If, however, a back-mixed reactor is employed [to decompose CHP], there will exist gradients of temperature and CHP concentration the magnitude of which will depend on the reactor geometry and recirculation ratio. In such a reactor the average temperature and CHP concentration are defined as the temperature and concentration that would result if the reactor contents were to be instantly homogenized. To estimate the averages it may be necessary to monitor the temperature and CHP concentration in more than one point. Monitoring CHP is essential to the success of this process.

(HX 1027, p. 7, line 37 to p. 8, line 9).

Zakoshansky's expert, Mr. Fulmer, testifies that "Hertzog takes all reasonable steps to keep the contents of his reactor at the same temperature and concentration, or 'isothermal.'" (ZX 2001, ¶ 126). In support of his position, Mr. Fulmer cites Hertzog's teaching that warns against hot spots in the reactor and that the temperature at various points in the reactor varies little from its average value. (*Id.*, citing Hertzog '190, ZX 2004, p. 7, lines 34-36). Mr. Fulmer testifies that the temperature gradients discussed in Hertzog '190 with respect to a back-mix reactor are of no value to Hertzog's process and may be dealt with by changing the reactor geometry and recirculation ratio. (*Id.*, citing Hertzog '190, ZX 2004, p. 7, line 37 to p. 8, line 3).

Hertzog's expert, Norman Gutzait, disagrees with Mr. Fulmer's interpretation of Hertzog's specification with regards to the use of non-isothermal reactors. Mr. Gutzait relies upon the same portion of Hertzog's specification, p. 7, line 37 to p. 8, line 3, and concludes that the use of a back-mix reactor as taught by Hertzog indicates that the first stage decomposer is operating in a non-isothermal manner. (HX 1030, ¶ 32). Mr. Gutzait testifies that Hertzog does not seek to avoid temperature gradients within the back-mix reactor and that such gradients are

reflective of a non-isothermal process. (*Id.* at ¶¶ 33-34).

Responding to Mr. Gutzait's testimony, Zakoshansky's expert, Mr. Fulmer, testifies that Levenspiel (ZX 2015) clearly defines a backmix reactor as a "mixed reactor" and therefore isothermal. (ZX 2030, ¶ 107). Mr. Fulmer also testifies that temperature gradients are not inherent in the operation of backmix reactors and that a constant reactant [CHP] concentration and constant temperature will be established throughout the reactor. (*Id.*).

Mr. Fulmer's testimony relies upon Levenspiel (ZX 2015) to demonstrate that back-mix reactors are isothermal. (ZX 2030, ¶ 107). While Levenspiel identifies "ideal" steady state-flow reactors as well-stirred and uniform throughout, Levenspiel specifically states that "we try to design real reactors such that their flows approach these ideals, and much of the development in this book centers about them." (ZX 2015, p. 98). Mr. Fulmer has failed to explain sufficiently whether the differences between ideal and real reactors affects the isothermal nature of a process as understood by one of ordinary skill in the art.

As testified by Mr. Fulmer, the term isothermal means constant temperature. (ZX 2001, ¶ 126). In construing the claims, we give the claims the broadest reasonable interpretation taking into account the language of the claims themselves as well as the teachings of the underlying specification. While both Zakoshansky and Hertzog's experts have advanced reasonable positions concerning the understanding of one skilled in the art concerning the isothermal or non-isothermal nature of back-mixed reactors, we credit the testimony of Mr. Gutzait over that of Mr. Fulmer for the proposition that Hertzog's back-mix reactors are considered non-isothermal. Mr. Gutzait's testimony provides sufficient support for the proposition that the temperature gradients

within Hertzog's reactor reasonably constitute a non-isothermal process and that this construction is consistent with the *broadest* reasonable definition of the term "non-isothermal." In contrast, Mr. Fulmer's testimony failed to provide sufficient support for the proposition that this definition was unreasonably broad. We conclude that the term "non-isothermal" means non-constant temperature and that the broadest reasonable meaning of the term encompasses the temperature gradients that are said to occur in Hertzog's back-mix reactor.

b. Multiplicity of Separate Sequential Reactors

Zakoshansky Preliminary Motion 2 identifies Hertzog claims 17-22 and 32 as directed to a method for decomposing CHP wherein the CHP decomposition occurs in a multiplicity of sequential reactors each with a controlled temperature range. (Paper No. 41, ¶ 16). Both parties appear to agree that Hertzog Figure 1 depicts a process where CHP is decomposed in a CHP decomposition reactor 1 with a portion of the CHP decomposition material sent through a cooler 6 to maintain the temperature in the CHP decomposition reactor 1 and a portion sent through a tube 7 to a DCP decomposition reactor. (Paper No. 41, ¶ 18, admitted by Hertzog, Paper No. 61 with additional citation to cooler 6, and Testimony of Mr. Fulmer, ZX 2001, ¶¶ 123, 125 and 127). The parties disagree as to whether or not tube 7 of Hertzog's process is a reactor.

Hertzog's specification does not specifically define the term "reactor." Hertzog's specification does identify an optional step (d) of the CHP decomposition reaction as carried out in tube 7. With regards to the tube 7, Hertzog's specification states:

No means for cooling is provided, because the only significant reaction taking place in this step is decomposition of residual CHP which has already reduced to 0.2 - 3 percent level in step (a).

(Hertzog '190, HX 1027, p. 9, lines 22-25).

According to Zakoshansky, tube 7 of Hertzog cannot be a CHP decomposition reactor as "tube 7 decomposes at most only 3 percent of the CHP used in the CHP cleavage step." (Paper No. 41, ¶ 19, ZX 2001, ¶ 123). Zakoshansky's expert, Mr. Fulmer, testifies that the cleanup function in Hertzog tube 7 is "not necessarily a separate function from that performed during the CHP decomposition step." (ZX 2001, ¶ 124).

Mr. Fulmer fails to identify sufficient evidence to support his position that a reaction of only 3 percent CHP in tube 7 precludes tube 7 from being considered a reactor as understood by one of ordinary skill in the art. Further, Sifniades identifies Sifniades tube 6, which appears identical to Hertzog tube 7, as a plug-flow reactor to decompose residual CHP. (ZX 2006, col. 4, lines 56-60).⁷

As is apparent from Hertzog's specification, and acknowledged by Zakoshansky's expert, Mr. Fulmer, Hertzog contemplates further reacting residual CHP in tube 7. The prior art, Sifniades, recognizes a tube for decomposing CHP as a plug-flow reactor. Providing the term "reactor" with its broadest reasonable construction in light of the record presented, we conclude that Hertzog "reactor 1" and "tube 7" constitute separate reactors that are placed in sequence.

⁷Hertzog expert, Mr. Norman Gutzait, identifies Hertzog '190 Figure 1 as similar to that of Figure 1 of Sifniades. (HX 1030, ¶ 36).

c. “Whereby . . . Safety of the Process is Controlled”

Zakoshansky Preliminary Motion 4 alleges that Hertzog lacks an enabling disclosure for the term “whereby . . . the safety of the process is controlled” as this term appears in Hertzog claim 33, from which claims 34 and 35 depend. (Paper No. 41, p. 1). Hertzog Opposition 4 states that “[b]y lowering the amount of residual CHP, Hertzog effectively protects the process from ‘hot spots’ and improves reactor safety.” (Paper No. 63, p. 25).

Hertzog Preliminary Motion 6 seeks to add new claims 44-50. Hertzog cites ‘190, p. 4, lines 28-30 as providing support for the limitation “safety of operation is enhanced” as it appears in proposed claim 44. (Paper No. 47, Appendix B, proposed claim 44). Hertzog’s specific citation is to part of a section that reads as follows:

Therefore, the present invention includes a process for decomposing a cumene oxidation product mixture containing cumene hydroperoxide (CHP) and dimethylphenyl carbinol (DMPC) to produce phenol, acetone and alpha-methyl styrene (AMS) *with enhanced safety of operation* and reduced by-product formation which comprises the steps:

(a) mixing the cumene oxidation product in a stirred or back-mixed reactor with an acid catalyst, with 10 to 100 percent acetone relative to the amount of acetone produced during the reaction and with up to 4 weight percent water relative to the reaction mixture, at an average temperature between about 50° C and about 90° C *for a time sufficient to lower the average CHP concentration of the reactor to between about 0.2 to about 3.0 weight percent* and wherein a portion of DMPC is converted to dicumyl peroxide (DCP); then

(b) reacting the reaction mixture from step (a) at a temperature between about 120 to about 150° C under plug-flow conditions for a time sufficient to decompose substantially all residual CHP and at least 90% of DCP formed in step (a).

(HX 1027, p. 4, line 24 to p. 5, line 7, emphasis added). This disclosure also appears in claim 1 and the abstract of the disclosure. (*Id.* at p. 13 and abstract).

Under the heading, "Description of the Prior Art," Hertzog's specification discusses the prior art Sifniades patent. According to Hertzog, a key element in the Sifniades patent "is the presence of relatively large concentrations of residual CHP in the first stage reactor." (*Id.* at p. 2, lines 30-32). Further, according to Hertzog:

Unfortunately, the higher the concentration of CHP in a stirred or back-mixed reactor, the less stable is the operation of the reactor, particularly in a large scale reactor. This is due to the fact that CHP decomposition is a highly exothermic, and at the same time it is accelerated by increasing temperature. Consequently, when a relatively large concentration of residual CHP is present, the opportunity exists for a large release of thermal energy if the reaction is accelerated by a hot spot, a local surge of catalyst or other ill-controlled events. *In typical commercial back-mixed reactors stable operation is very difficult to achieve at average residual CHP concentrations greater than 2-3 weight percent.*

(*Id.* at p. 2, line 36 to p. 3, line 11, emphasis added).

Under the heading "Detailed Description of the Invention," Hertzog provides further details concerning step (a) of Hertzog's cumene decomposition process. According to Hertzog, "[i]t will be appreciated that the operational objective is to maintain the average CHP concentration in the reactor from between about 0.2 weight percent to about 3 wt percent." (*Id.* at p. 7, lines 20-22).

Hertzog's motions and its involved specification consistently identify maintaining the CHP concentration in Hertzog's step (a) reactor at a level of from about 0.2 to about 3 weight percent to avoid hot spots and provide enhanced safety. While we cannot say that lowering the CHP level to about 0.2 to about 3 weight percent in Hertzog's step (a) CHP reactor is the *broadest* reasonable construction for the improved and enhanced safety referred to in Hertzog's claims, we are certain that Hertzog's claimed safety limitations encompass lowering the CHP

levels to about 0.2 to about 3 weight percent in the step (a) of the CHP decomposition process.

In so construing the claims, we note that Sifniades states that the reaction mixture leaving a CHP decomposition step (a) contains 0.5 to 5 weight percent, and that it is “preferable to have between 0.8 to about 2% CHP, all by weight.” (ZX 2006, col. 3, lines 63-68).

d. Whereby “the reaction is more controllable”

Hertzog independent claims 7, 11, 14, 17 and 25 conclude with the language “and the reaction is more controllable and more selective.” (Zakoshansky Master Claim Chart, ZX 2002). Hertzog acknowledges that its involved specification does not use the word “control.” (Hertzog Opposition 4, Paper No. 63, ¶ 74). Hertzog alleges that the term control is a synonym for the word “maintain.” (Paper No. 63, ¶ 64). Hertzog specifically states that:

Although Hertzog never uses the word “control” in his application, one of ordinary skill would be able to implement Hertzog’s teachings to “maintain” residual CHP concentration at the “operational objective” of a value between 0.2 to 3.0 weight percent.

(*Id.* at p. 24).

Hertzog proposes to add new claim 50, which recites “whereby the reaction is more controllable.” (Paper No. 47, Appendix B). According to Hertzog, its involved specification describes this limitation at p. 4, line 12 and lines 28-30. Hertzog’s specification at p. 4, line 12 discusses effecting decomposition of CHP in a “relatively stable” manner. Hertzog’s specification at p. 4, lines 28-30 describes enhanced safety of operation and reduced by-product formation for a process having certain steps, which include employing reaction conditions such that the average CHP concentration of the reactor in step (a) is lowered to between about 0.2 to

about 3.0 weight percent. Hertzog cites the testimony of Norman Gutzait for support for the proposition that maintaining control of the residual amount of CHP present in the decomposition reaction mixture at an amount of between 0.2 weight percent and 3.0 weight percent is an operational objective in Hertzog's specification. (HX 1030, ¶ 42).

Based upon the evidence of record, we conclude that a reasonable construction of the terminology "whereby the reaction is more controllable" includes a process that maintains reactor conditions in step (a) of Hertzog's CHP decomposition process such that the CHP level is lowered to between about 0.2 to about 3.0 weight percent. Again, we note that Sifniades describes employing a CHP decomposition step (a) that preferably lowers the CHP levels to 0.8 to about 2 weight percent. (ZX 2006, col. 3, lines 63-68).

e. "Whereby selectivity for alpha-methyl styrene is enhanced"

Hertzog independent claim 26 recites "whereby selectivity for alpha methyl styrene is enhanced." (ZX 2002). According to Hertzog, its specification teaches how improved yields of AMS are obtained, relative to the Sifniades process, for a given amount of residual CHP when the reaction mixture contains an excess of acetone. Hertzog states that:

This means that one of ordinary skill may obtain the same improved AMS yields, but with a safer, reduced amount of CHP, so that the process for decomposing technical CHP, which includes the process for decomposing DCP is more controllable.

(Paper No. 63, p. 17). Consistent with this position, Hertzog's expert, Norman Gutzait, testifies that "a definite improvement in AMS yield was achieved by Hertzog, et al. by having excess acetone present in the mixture." (HX 1030, ¶ 61).

Hertzog proposes to add new claim 44, which recites “whereby the yield of alpha methylstyrene is increased.” (Paper No. 47, Appendix B). Hertzog cites the following paragraph as providing support for this limitation:

By adding acetone to the cumene oxidation product in a stirred or back-mixed reactor, in addition to that acetone normally produced by decomposition of CHP, relatively high yields of AMS are obtained even with residual CHP as low as 0.2 wt. percent.

(HX 1027, p. 4, lines 14-18).

Providing Hertzog’s claims with their broadest reasonable construction, we construe the phrase “whereby selectivity for alpha-methyl styrene is enhanced” as encompassing CHP decomposition processes that employ excess acetone in the CHP decomposition reaction mixture. We note that the prior art reference, Messina, directs one skilled in the art to employ excess acetone to improve AMS yields in a CHP decomposition process. (Messina, ZX 2007, p. 12 “As it is clearly seen the most important variable is the phenol/acetone ratio (r). At low values of r, the best buffer effect with the maximum preservation of α -MS is attained.”).

f. “Whereby the dicumyl peroxide decomposition is better controlled”

Hertzog independent claims 29 and 31 include the recitation “whereby the dicumyl peroxide decomposition is better controlled.” (ZX 2002). According to Hertzog, its ‘190 specification teaches how improved yields of AMS are obtained when the reaction mixture contains an excess of acetone. (Paper No. 63, p. 17). Hertzog takes the position that employing excess acetone allows higher yields such “that the process for decomposing technical CHP,

which includes the process for decomposing DCP, is more controllable.” (*Id.*). Yet, Hertzog has conceded that its claims 29 and 31, which state that the DCP process is better controlled, are anticipated by Sifniades, which does not mention the use of excess acetone. (Paper No. 60, p. 19).

We are uncertain as to the broadest reasonable construction of the phrase “whereby the dicumyl peroxide decomposition is better controlled.” This phrase is not clear on its face nor does Hertzog’s involved application explicitly identify the specific process conditions required to “better” control the DCP decomposition.

Zakoshansky’s expert, Mr. Fulmer, has testified that all the limitations present in claims 29 and 31 described by Sifniades. (ZX 2001, ¶ 91). We credit Mr. Fulmer’s testimony on this point and, given the state of the record, we conclude that Hertzog’s whereby clause in Hertzog’s claims 29 and 31 merely states the result of the limitations in the claims and adds nothing to the patentability or substance of the claims.

g. The reactors are thereby controlled

Hertzog claim 32 contains the following whereby clause:

[W]hereby the smaller size reactor decomposes essentially all of the cumene hydroperoxide remaining in said portion of the outlet stream and provides an analytical indication of completeness of the cumene hydroperoxide decomposition reaction and the reactors are thereby controlled.

(ZX 2002).

Zakoshansky argues that Hertzog’s reactors are not controlled. (Zakoshansky Preliminary Motion 4, Paper No. 41, p. 15). Hertzog argues that, while the term “control” is not used in

Hertzog's specification, Hertzog's specification teaches one skilled in the art to maintain a "residual CHP concentration at the 'operational objective' of a value between 0.2 to 3.0 weight percent." (Paper No. 63, p. 24).

Based upon the evidence of record, we conclude that the phrase "and the reactors are thereby controlled" in Hertzog claim 32 encompasses a CHP decomposition process that lowers residual CHP levels to about 0.2 to about 3 weight percent. As noted above, Sifniades states that the reaction mixture leaving a CHP decomposition step (a) contains 0.5 to 5 weight percent, and that it is "preferable to have between 0.8 to about 2% CHP, all by weight." (ZX 2006, col. 3, lines 63-68).

h. The efficient generation of recycle acetone

The preamble in Hertzog claim 43 states "[a] method for the efficient generation of recycle acetone from cumene in a process which prepares phenol from cumene." Zakoshansky contends that Hertzog's claimed and described processes do not involve the "efficient" generation of acetone. (Paper No. 41, p. 17). Hertzog claim 43 recites a process where DCP is decomposed to form phenol, acetone and AMS and acetone is allowed to evaporate, a portion of which is then sent to a CHP decomposition reaction. (ZX 2002).

Precedent has "long eschewed the use of an absolute rule according or denying all preambles limiting effect, having recognized that one cannot determine a preamble's effect except by reference to the specific claim of which it is a component." *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 621, 34 USPQ2d 1816 1821

(Fed. Cir. 1995). Yet, a claim preamble is limiting only if “it recites essential structure or steps, or if it is necessary to give ‘life, meaning, and vitality’ to the claim.” *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999). Specifically, a preamble is not generally limiting where the body of the claim describes a structurally complete invention such that the deletion of the preamble does not affect the structure or steps of the claimed invention. *Intirtool Ltd. v. Texar Corp.*, 369 F.3d 1289, 1295, 70 USPQ2d 1780, 1784 (Fed. Cir. 2004).

The body of claim 43 specifically recites that the acetone is allowed to evaporate and at least a portion of the acetone is sent to the CHP decomposition reaction. The preamble of claim 43, which recites that the acetone is efficiently generated, does not add additional structure or steps to the body of the claim. Accordingly, providing Hertzog claim 43 with its broadest reasonable construction, we conclude that the preamble of claim 43 fails to give life, meaning and vitality to the claim and, therefore, is not entitled to any patentable weight.

i. Miscellaneous Hertzog Claim Construction

Hertzog claims 40, 41 and 42 are improper dependent claims. Hertzog claim 40 is a method claim and depends from claim 39, which is a composition claim. Hertzog claim 41 is a composition claim and depends from method claim 40. Hertzog claim 42 is a method claim and depends from composition claim 41.

Hertzog recognizes the improper dependency of its claims and states that the correct claim dependency is as follows: 1) Claim 40 depends from claim 36; 2) Claim 41 depends from

claim 39; and 3) Claim 42 depends from claim 40. (Paper No. 104, pp. 9-10). We have analyzed the patentability of Hertzog claims 40-42 using the claim dependency urged by Hertzog. To the extent Hertzog claims 40-42 survive the interference, Hertzog should correct the dependency of these claims upon resumption of *ex parte* prosecution.

2. Zakoshansky Alleges that Hertzog's Claims are Unpatentable over Prior Art

Zakoshansky Preliminary Motion 1 alleges that Hertzog claims 7, 14, 26-31, 36, 39 and 43 are unpatentable over the prior art, in particular Sifniades and Messina. (Paper No. 46, p. 1). Similarly, Zakoshansky Preliminary Motion 3 alleges that Hertzog claims 8-13, 15-25, 32-35, 37-38 and 40-42 are unpatentable over the prior art, in particular Sifniades and Messina. (Paper No. 40, p. 1). Taken together, Zakoshansky Preliminary Motions 1 and 3 allege that all of Hertzog's involved claims are unpatentable over the prior art.

Zakoshansky Preliminary Motion 3 is said to be contingent upon the denial of Zakoshansky Preliminary Motion 2 (Paper No. 39), which alleges that Hertzog claims 8-13, 15-26, 31-35, 37-38 and 40-42 lack written descriptive support. According to Zakoshansky, Hertzog's claims identified in Zakoshansky Preliminary Motion 3 lack written descriptive support, but to the extent the Board determines that Hertzog's claims are described, the prior art likewise describes Hertzog's claims. There is considerable overlap in the relief requested in Zakoshansky Preliminary Motions 1 and 3 as both Zakoshansky Preliminary Motions 1 and 3 request that Hertzog's claims be held unpatentable over Sifniades alone or in combination with Messina. We exercise our discretion and review Zakoshansky Preliminary Motions 1 and 3

together prior to our review of Zakoshansky Preliminary Motion 2. 37 C.F.R. § 1.640(b).⁸

- a. Hertzog Claims 29 and 31 are Anticipated By Sifniades, U.S. Patent 4,358,618

Zakoshansky alleges that Hertzog claims 29, 31-32 and 36 are anticipated by Sifniades. (Paper Nos. 40 and 46).⁹ Hertzog opposes with respect to claims 32 and 36, but concedes that claims 29 and 31 are anticipated by Sifniades. (Paper No. 60, p. 19 and Paper No. 62, p. 18).

Hertzog claim 32 requires an addition to the reaction mass of 10 to 100 percent acetone relative to the amount of acetone produced during the CHP decomposition reaction. Hertzog claim 36 requires that the decomposition of cumene hydroperoxide be accomplished in the presence of 10 to 100 percent acetone relative to the amount of acetone produced during the reaction.

Zakoshansky states that Sifniades describes every element recited in Hertzog claims 32 and 36. Zakoshansky directs our attention to the Declaration of John W. Fulmer (ZX 2001, ¶¶ 47-62 and 90-94) to support the conclusion that Sifniades anticipates claims 32 and 36. (Paper No. 40, p. 18, Paper No. 46, p. 20). The cited portions of Fulmer's declaration fail to identify where Sifniades describes the use or addition of 10 to 100 percent acetone relative to the amount of acetone produced during the reaction.

⁸See, 37 C.F.R. §41.125(a), Board may take up motions for decision in any order.

⁹Zakoshansky filed an errata indicating that claims 32 and 36 should be grouped with the claims considered for obviousness and not anticipation. (Paper No. 78).

Fulmer's declaration directs our attention to a Master Claim Chart (ZX 2002) that is said to demonstrate how each of the elements of claims 32 and 36 is disclosed by Sifniades. (*Id.* at ¶¶ 91-92). The Master Claim Chart does not identify where Sifniades describes the 10 to 100 percent acetone recited in claims 32 and 36. Rather, the Master Claim Chart cites Messina as disclosing the presence of excess acetone. (*Id.* at pp. 49 and 55). Additionally, the claims charts attached to Zakoshansky Preliminary Motions 1 and 3 likewise direct our attention to Messina for the disclosure that one skilled in the art could advantageously conduct the CHP decomposition process in the presence of excess acetone. (Paper Nos. 40 and 46, Tab 8).

As to the addition or use of excess acetone in a CHP decomposition reaction, Zakoshansky Replies 1 and 3 argue that:

It would take one experiment to determine whether the combination of Messina with Sifniades was viable. All that had to be done was to add excess acetone to Sifniades' process. Either it would work or it would not. It did work - both for Hertzog and Zakoshansky.

(Paper No. 71, p. 10 and Paper No. 73, p. 8).

Hertzog oppositions 1 and 3 state as fact that Sifniades does not disclose or suggest the use of recycled or excess acetone. (Paper Nos. 60 and 62, ¶ 42). This statement of fact was admitted by Zakoshansky in its replies. (Paper Nos. 71 and 73).

Zakoshansky, as the moving party, bears the burden of proving that it is entitled to the relief request. 37 C.F.R. §1.637(a). For anticipation the dispositive question is whether one skilled in the art would reasonably understand that all claim limitations were disclosed in a single prior art reference. *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368, 66 USPQ2d 1801, 1809 (Fed. Cir. 2003). Zakoshansky has demonstrated, and Hertzog has

conceded, that all the limitations present in Hertzog claims 29 and 31 are disclosed by Sifniades. Zakoshansky however, has not demonstrated that Sifniades discloses the presence or addition of 10 to 100 percent acetone relative to the amount of acetone produced during the CHP decomposition reaction as set forth in Hertzog claims 32 and 36. Zakoshansky Preliminary Motion 1 is **granted** with respect to claims 29 and 31 and **denied** to the extent it requests a determination that Sifniades anticipates Hertzog claims 32 and 36.

b. Obviousness

Zakoshansky argues that, to the extent that Hertzog's claims are described by Hertzog's specification, Sifniades discloses each and every element of Hertzog's involved claims with the exception of the use of excess acetone in a CHP decomposition process. (Paper No. 40, p. 21 and Paper No. 46, p. 20). Hertzog's attorney has acknowledged that the Hertzog process is "in essence" the same as the Sifniades process with the improvement being the use of recycled acetone. (Oral Hearing Transcript, Paper No. 107, p. 47, lines 14-17, "Because, in essence, Your Honor, the Hertzog process is the Sifniades process with the improvement of the recycled acetone.").

Regarding obviousness, the Federal Circuit has stated that:

[A] proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success.

In re Vaeck, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Zakoshansky Preliminary Motions 1 and 3 allege that each of the limitations present in Hertzog claims 7-28, 30, 33-35 and 37-43 is taught or suggested by either Sifniades or Messina. (Paper Nos. 40 and 46, Tab 8, and Master Claim Chart, ZX 2002). Generally, Zakoshansky cites Sifniades for the following teachings:

- i. Process for decomposing a cumene oxidation product containing cumene hydroperoxide (CHP) and dimethylphenyl carbinol (DMPC) to produce phenol acetone and, alpha-methyl styrene (AMS). ZX 2006, col. 2, lines 19-23.
- ii. Mixing the cumene oxidation product with an acid catalyst, such as sulfuric acid. ZX 2006, col. 2, lines 26-27, col. 4, lines 4-9, and Examples 1-18.
- iii. Employing an acid catalyst level of between 30 and 400 ppm. *Id.*, col. 4, lines 11-12.
- vi. Conducting the CHP decomposition in the presence of cumene. *Id.*, col. 6, line 67 to col. 7, line 1.
- v. Conducting the CHP decomposition in a continuous manner in a decomposition reactor. *Id.*, Fig. 1, ref. 1-5, explained at col. 5, lines 1-21.
- vi. Conducting the CHP decomposition in a multiplicity of separate sequential reactors each with a controlled temperature range. *Id.*, Fig. 1, ref. 1, 6, 7, and 8. Specifically, Fig. 1, ref. 1 is identified as a backmix reactor for CHP decomposition where the outlet stream is sent through tube 6. Tube 6 is described by Sifniades as a third reactor for CHP decomposition which is plug-flow and "maintained at a temperature which is roughly equal to that of the first reactor." *Id.*, col. 4, lines 56-60.
- vii. Conducting the decomposition reaction in a backmix reactor at a temperature of from 50 to 90°C. *Id.*, col. 2, lines 26-34.
- viii. Decomposing the CHP to a level of between 0.5 to 5%. *Id.*, col. 3, lines 62-63.
- ix. Converting the DMPC in the cumene oxidation product to dicumylperoxide (DCP). *Id.*, col. 2, lines 33-34.
- x. Transferring the DCP to a plug flow reactor. *Id.*, Fig. 1, ref. 1, 7 and 8.
- xi. Heating the DCP in a separate vessel to a temperature of from 120 to 150°C. *Id.*, Fig. 1, ref. 7, 8 and col. 5, lines 22-35.
- xii. Decomposing the DCP to form phenol, acetone and AMS. *Id.*, col. 2, lines 40-43.
- xiii. Conducting the DCP decomposition in the presence of an acid catalyst. *Id.*, col. 2, ln. 66 to col. 3, line 1.
- xiv. Employing a plug-flow reactor (tube 6, pipe 8) of smaller size than the decomposition reactor (backmix reactor 1). *Id.*, generally Fig. 1 and Example 18.
- xv. The outlet temperature of plug flow reactor (pipe 8) is 120 to 150°C whereas the inlet of the plug flow reactor is approximately 50-90°C. ZX 2006, col. 5, lines 3-5 and 31.

- xvi. The DCP decomposition conducted at a higher temperature (120 to 150° C) than the CHP decomposition (50 to 90° C.). *Id.*, col. 2, ln 29 and col. 2, ln 64 to col. 3, ln. 3).
- xvii. Employing a preferred amount of water in the CHP decomposition step of from 0.8 to 1.5% by weight. *Id.*, col. 4, lines 23-26 and Examples 10 (0.5%) and 11 (1.0%).
- xviii. Water is desirably added to the CHP decomposition reactor in addition to that formed by the desired reaction of DMPC with CHP to form DCP. *Id.*, col. 4, lines 12-16.

(See Zakoshansky Master Claim Chart, ZX 2002). According to Zakoshansky, the following limitations present in Hertzog's claims as inherent in the CHP decomposition process described by Sifniades:

- i. Whereby the rate of decomposition of cumene hydroperoxide is reduced. (*See, e.g.,* Hertzog claims 7, 11, 14, 17, and 25).
- ii. Wherein the cumene hydroperoxide is decomposed in a non-isothermal manner. (*See, e.g.,* Hertzog claims 8 and 25).
- iii. Whereby the selectivity for alpha methyl styrene is enhanced. (*See, e.g.,* Hertzog claim 26).
- iv. Whereby the dicumyl peroxide decomposition is better controlled. (*See, e.g.,* Hertzog claims 29, 31).
- v. An improved method for maintaining control of an acid catalyzed cumene hydroperoxide decomposition. (*See, e.g.,* Hertzog claim 32).
- vi. The [backmixed and plug flow] reactors are thereby controlled. (*See, e.g.,* Hertzog claim 32).

(See Zakoshansky Master Claim Chart, ZX 2002). Zakoshansky relies upon the testimony of Mr. Fulmer who identifies the above limitations are inherent within the teachings of Sifniades. (ZX 2001).

As to Hertzog's claimed use of excess acetone, Zakoshansky argues that Messina discloses the advantages of carrying out a CHP decomposition reaction in the presence of excess acetone. (ZX 2002, p. 2 citing Messina, ZX 2007, Fig. 4 and p. 12, col. 2). Zakoshansky cites Messina as describing the use of 59% excess acetone, which corresponds to a phenol/acetone

ratio of 0.63 and an acetone to phenol ratio of 1.59:1. (ZX 2002, p. 2, citing ZX 2007, Fig. 4, p. 13).

Additionally, Zakoshansky relies upon the testimony of Mr. Fulmer (ZX 2001) to demonstrate that the “obvious combination” of the teachings of Sifniades and Messina taken in light of well-known chemical and engineering principles meets the following Hertzog limitations:

- i. The reaction is more controllable and more selective. (*See, e.g.*, Hertzog claim 7).
- ii. Recycling at least a portion of the acetone collected from step (c) [acetone evaporation] to the cumene hydroperoxide decomposition step (a). (*See, e.g.*, Hertzog claim 26).
- iii. Whereby selectivity is higher and safety of the process is improved. (*See, e.g.*, Hertzog claim 33).

(See Zakoshansky Master Claim Chart, ZX 2002 and ZX 2001, ¶¶ 68, 82, 116, 154).

Zakoshansky states that Sifniades identifies AMS as a useful product of the CHP decomposition process. Zakoshansky further states that Messina discloses that the use of excess acetone will enhance AMS yields. Zakoshansky still further argues that one of ordinary skill in the art who wanted to increase the yield of AMS in the process of Sifniades would, based upon the teachings of Messina, employ excess acetone in the Sifniades process. Zakoshansky concludes that, to the extent Hertzog’s claimed process is described, all limitations present in Hertzog’s involved claims are present in, or obvious over, the combined teachings of Sifniades and Messina. (Paper No. 46, pp. 20-21).

Hertzog Oppositions 1 and 3 appear to raise identical objections against combining the teachings of Sifniades and Messina to arrive at Hertzog’s claimed invention. (Paper Nos. 60 and 62). Specifically, Hertzog Oppositions 1 and 3 allege that Zakoshansky has failed to demonstrate

that there is: 1) motivation to combine the teachings of Sifniades and Messina; and 2) a reasonable expectation of success for the proposed Sifniades and Messina combination. (Paper Nos. 60 and 62, p. 19).

According to Hertzog, Sifniades teaches a two-stage process for the decomposition of CHP wherein AMS yield is maximized by forming DCP in the first stage and decomposing DCP to phenol, acetone and AMS in the second stage at a higher temperature than the first stage. (Paper No. 60, pp. 11-12; Paper No. 62, pp. 10-12). In contrast Messina is said to disclose the parameters for dehydrating DMBA directly to AMS under single stage conditions but does not suggest using excess acetone in a two-stage process, such as Sifniades' process. (Paper Nos. 60 and 62, pp. 12 and 20). Further, Hertzog states that Messina teaches away from three key features of Sifniades: 1) maximizing the formation of DCP in the CHP decomposition stage; 2) having residual CHP in the effluent from the CHP decomposition stage; and 3) decomposing DCP and residual DMBA at elevated temperatures to maximize AMS yields. (Paper Nos. 60 and 62, pp. 14-15). Additionally, Hertzog alleges that one skilled in the art lacked a reasonable expectation of success of combining the Sifniades and Messina process conditions. (Paper No. 60, p. 16, Paper No. 62, p. 15). The parties arguments and evidence of record concerning the obviousness of combining the teachings of Sifniades and Messina are discussed below.

- i. Messina is Directed to the Search for the Optimal Operating Conditions for the Conversion of Cumene into Phenol and Acetone and is Not Limited to a Single-Stage Process

Hertzog relies upon the testimony of its expert, Dr. Levy, for the proposition that Sifniades is directed to a two-stage process wherein the first stage effects the decomposition of CHP in two reaction vessels: a back-mix reactor and a cooler. (HX 1031, ¶ 5). Levy testifies that DCP is formed in the first stage from the condensation of DMBA and CHP and then decomposed in a second-stage dehydrator reactor at a higher temperature. (*Id.* at ¶ 6). Levy further testifies that Messina does not address a two-stage decomposition and that Messina considers the decomposition of DCP only briefly. (*Id.* at ¶ 8). Additionally, Levy testifies that Messina models a single-stage CHP process and that Messina's experiments follow a laboratory scale batch dehydration of DMBA to AMS that does not address the effect of excess acetone on the decomposition of CHP or DCP. (*Id.* at ¶¶ 10 and 13-15).

Under cross-examination, Dr. Levy testified that Messina teaches the basic chemistry of the cumene method for the production of phenol (ZX 2047, Levy Tr. 308:8-16) and that Messina is not limited to a specific process but is really focused on the chemistry of CHP decomposition (ZX 2047, Levy Tr. 309:23 - 310:6). Furthermore, under cross-examination, Dr. Levy testified that Messina does not state in black and white that the Messina teachings are directed to a single stage process but that, Dr. Levy, "being an expert in the field" recognizes that Messina implies a single stage process. (ZX 2047, Levy Tr. 310: 7-23; 345:23 - 346:12). Dr. Levy opined that the point of Messina was to explain and elucidate the chemistry of, and not to present a process for, decomposing CHP. (ZX 2047, Levy Tr. 338:6-17). Finally, Levy agreed under cross-examination that both Sifniades and Messina share the same goal of minimizing formation of AMS dimers and cumylphenols. (ZX 2047, Levy Tr. 338:22 - 339:7).

Zakoshansky relies upon the testimony of Mr. Fulmer to support its position that one skilled in the art would have employed excess acetone in the process of Sifniades based upon Messina's teaching that excess acetone maximizes AMS formation. Mr. Fulmer, like Hertzog's expert, Dr. Levy, testifies that Messina and Sifniades shared a common goal, *i.e.*, to maximize AMS formation and minimize by-product formation. (ZX 2030, ¶ 42). Mr. Fulmer also testifies that Messina Fig. 2 and Sifniades' Examples 6-8 illustrate the same chemistry, the same conversion of DMPC to AMS, and the same conversion of AMS into undesired by-products. (*Id.* at ¶ 51). According to Mr. Fulmer, Messina is a chemistry reference as opposed to a process reference and is not confined to a specific one or two stage process. (*Id.* at ¶ 29). Mr. Fulmer states that there is nothing in Messina, or in any reference cited by Hertzog, that suggests excess acetone as having a detrimental effect on the formation or decomposition of DCP. Mr. Fulmer further states that Messina's failure to include CHP in Messina's Figs. 1-4 experiments is not inconsistent with the teachings of Sifniades as both followed the same experimental protocol. (*Id.* at ¶¶ 65 and 70, noting that Sifniades Examples 6-8 did not include CHP in the reaction mixtures). According to its abstract, Messina is said to provide a discussion on the state of the art on the number and nature of by-products produced in the conversion of cumene into phenol and acetone and to provide an investigation into the formation mechanism to improve the overall efficiency of the process. (ZX 2007). Messina does not specifically confine the chemistry discussed in the article to a particular single-stage or two-stage process. Therefore, based upon the evidence presented, we conclude that Dr. Levy's narrow interpretation of Messina's teachings lacks sufficient support and fails to reflect properly the understanding of one

of ordinary skill in the art. We credit the testimony of Mr. Fulmer, Zakoshansky's expert, that one of ordinary skill in the art would have understood that Messina's teachings are not limited to a particular one-stage or two-stage process and that both Messina and Sifniades seek to maximize AMS formation in a CHP decomposition process.

ii. Messina Does Not Teach Away from Sifniades

As mentioned above, Hertzog contends that Messina teaches away from the following features of Sifniades: 1) promoting the formation of DCP; 2) maintaining residual CHP from the first-step in a two-step process; and, 3) decomposing DCP to form AMS at elevated temperatures. (Paper Nos. 60 and 62, p. 21). Zakoshansky disagrees and argues that Hertzog's contention is based upon a misreading of the Messina reference. (Paper No. 71, p. 7).

A significant factor to be considered in reviewing obviousness is whether a reference teaches away from the claimed invention. While a teaching away may be a significant factor, "the nature of the teaching is highly relevant and, must be weighed in substance." *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). As stated in *In re Gurley*:

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant.

Id. at 27 F.3d at 553, 31 USPQ2d at 1131.

Hertzog argues that Sifniades teaches that AMS yield can be increased by condensing DMBA in a first stage to form DCP and then decomposing the DCP in a second stage at an elevated temperature, 120 to 150° C., to form phenol, acetone and AMS. (Paper Nos. 60 and 62, ¶¶ 43 and 62 citing Levy Dec., HX 1031, ¶¶ 6, 23). Hertzog's expert, Dr. Levy, interprets Messina as cautioning that the decomposition of CHP must be controlled to avoid the formation of DCP. (Levy Dec., HX 1031, ¶ 17). Dr. Levy testifies that in Messina's model, any DMBA that is transformed to DCP results in a reduced yield of AMS. (Levy Dec., HX 1031, ¶ 18). Dr. Levy further testifies that Messina's model requires that the decomposition of CHP be completed in a single step and that low temperatures must be employed to maximize the yield of AMS. (*Id.* at ¶¶ 20-23). Under cross-examination however, Dr. Levy testified that Messina does not explicitly refer to a single-step process and is really focused on the chemistry of CHP decomposition. (ZX 2047, Levy Tr. 309:23 - 310:6).

Sifniades teaches that DCP is relatively stable under conditions that cause substantial CHP decomposition and DCP can itself be decomposed to form AMS, phenol and acetone. (ZX 2006, col. 2, lines 40-43 and 64-67). Both Sifniades and Messina recognize that DCP is not a useful end-product. Messina teaches that certain process conditions, *e.g.*, temperature, residence time and water concentration, are parameters that have to be optimized to ensure low values of DCP. (ZX 2007, p. 15, first col.). As to Hertzog's specific allegation that Messina teaches away from the use of Sifniades' higher DCP decomposition temperatures, we note Messina explicitly states that temperature is a parameter to be optimized and that Messina Fig. 2 demonstrates that higher temperatures required less time to form AMS than lower temperatures. (See, ZX 2030,

¶ 59).

Hertzog and its expert, Dr. Levy, have interpreted the teachings of Messina too narrowly. As recognized by Zakoshansky and its expert, Mr. Fulmer, phenol is the desired end product of the CHP decomposition reaction discussed in both Sifniades and Messina and AMS is recognized as a useful by-product. (ZX 2030, ¶ 64a). Both Sifniades and Messina teach reaction conditions that are result effective variables, *e.g.*, as temperature increases the time to maximize AMS formation decreases. (*Id.* at ¶ 59). Based upon our reading of Sifniades and Messina, taken in light of the testimony and supporting evidence supplied by the parties, we conclude that Messina does not teach away from the Sifniades process. We specifically credit the testimony of Zakoshansky's expert, Mr. Fulmer, over that of Hertzog's expert, Dr. Levy, and hold that one skilled in the art would have understood that both Sifniades and Messina are consistent in their recognition that time, temperature and catalyst concentration are result effective variables in the decomposition of CHP and the formation of AMS.

iv. One of Ordinary Skill in the Art Could Combine the Teachings of Sifniades and Messina Without Undue Experimentation

Hertzog argues that there is no reasonable expectation of success to combine the teachings of Sifniades and Messina as such a combination would have required undue experimentation. Specifically, Hertzog argues that one skilled in the art would understand that the reaction conditions in Sifniades' process and the Messina article were "mutually exclusive." (Paper Nos. 60 and 62, ¶ 71). Hertzog contends that Messina cautions one skilled in the art to

avoid the formation of DCP whereas Sifniades forms DCP in the first-stage of the process and decomposes it in the second-stage. (Paper Nos. 60 and 62, ¶¶ 68-70). Hertzog concludes that one cannot effectively run a single-stage process using the reaction conditions of a two-stage process and *vice-versa*. (Paper Nos. 60 and 62, ¶ 70).

As discussed above, the chemistry discussed in Messina is not limited to a single-stage process. Hertzog is correct that Messina cautions against forming DCP but Messina also teaches that DCP should not be passed unchanged to distillation and this teaching is entirely consistent with that of Sifniades, which teaches converting at least 90% of the DCP to AMS prior to distillation. (ZX 2006, claim 1; ZX 2007, pp. 14-15).

Hertzog alleges that one skilled in the art could not have combined Messina's use of excess acetone with the Sifniades process without undue experimentation. (Paper Nos. 60 and 62, ¶ 72). Hertzog relies upon the declaration testimony of Dr. Levy to support its contention that Messina's experiments failed to contain CHP and that no conclusions could be drawn by one skilled in the art as to the effect of excess acetone on the CHP decomposition or DCP decomposition steps in Sifniades. (Paper Nos. 60 and 62, ¶ 75; HX 1031, ¶ 39). Hertzog, again citing Dr. Levy's declaration testimony, concludes that one skilled in the art would have to conduct extensive testing to determine the effect of the excess acetone on the reactions occurring in Sifniades' process. (Paper Nos. 60 and 62, ¶ 76; HX 1031, ¶ 39).

On the other hand, Zakoshansky's expert, Mr. Fulmer, testifies that one skilled in the art would have been surprised if the proposed combination of Messina and Sifniades had not worked. According to Mr. Fulmer, there was no contrary teaching in the art that the presence of

excess acetone would interfere with the decomposition reactions of either DMPC or DCP to AMS. Mr. Fulmer cites several prior art references to support his position that acid-catalyzed CHP decomposition processes were known to have succeeded in the presence of excess acetone. (ZX 2030, ¶¶ 9 and 76-78). Additionally, Mr. Fulmer relies upon the cross-examination testimony of Hertzog's experts, Dr. Levy and Mr. Gutzait to establish that it would take only one experimental run to determine whether or not the combination of Messina with Sifniades was viable. (ZX 2030, ¶ 8, citing ZX 2047, Levy Tr. p. 460:3-21 and ZX 2048, Gutzait Tr., 133:22-136:16).

Hertzog's expert, Mr. Gutzait, testified on cross-examination that:

- Q. What sorts of experimenting do you believe someone of ordinary skill would be required to do [to add acetone, such as that described in Hertzog's specification]?
- A. If it were my plant and I was implementing this, after having put together the mechanical equipment to *be able to add the acetone to the system*, and having already a CHP monitoring system, and the DCP sampling, as shown in that section, after the plug-flow reactor, you would initially start up the plant as normal, and then slowly start increasing the acetone addition. And then you would be able to follow the performance by looking at the CHP concentration on your online CHP monitor with delta T calorimeter. And simultaneously, you can start looking at the DCP formation in that pipeline nine. And again, you would also start out with what you look at as - or what you operated at as a normal temperature plug-flow reactor. *And just bringing the plant on that, you could probably come to your optimal conditions within, you know, a reasonable amount of time, several days at most, and you would be there. And that, I don't view as an unreasonable amount of experimentation.* It's what you would do at any plant start-up; you start up slow and bring your conditions up to where you think you're going to be. And you sample all along the way to confirm your performance.

(ZX 2048, 135:4-136:2, emphasis added).

Zakoshansky has demonstrated that one of ordinary skill in the art would have been able to combine the teachings of Messina and Sifniades without undue experimentation. One of

ordinary skill in the art could have readily conducted an experiment and adjusted the amount of excess acetone to determine the optimal conditions for a CHP decomposition process, such as that described by Sifniades. In particular, we credit the direct testimony of Zakoshansky's expert, Mr. Fulmer, and the cross-examination testimony of Mr. Gutzait and find that one of ordinary skill in the art would have been able to determine the optimal conditions for adding excess acetone to a CHP decomposition process within a reasonable amount of time. We do not credit the direct testimony of Hertzog's expert's, Dr. Levy and Mr. Gutzait, to the extent they suggest undue experimentation was needed to combine the teachings of Sifniades and Messina.

v. One of Ordinary Skill in the Art Would Have Expected
Improved Yields of AMS by Using Excess Acetone to
Sifniades' Process

Hertzog contends that one skilled in the art did not possess a reasonable expectation of success for combining the teachings of Sifniades and Messina. (Paper No. 60, p. 21 and Paper No. 62, p. 20). Zakoshansky's expert, Mr. Fulmer, testifies that it would have been surprising if the combination of Messina and Sifniades had not worked. (ZX 2030, ¶ 9). Mr. Fulmer cites the cross-examination testimony of Hertzog's experts, Dr. Levy and Mr. Gutzait, as supporting his contention. In particular, Mr. Fulmer testifies that one skilled in the art would have expected an increase in AMS yield in the Sifniades process when excess acetone of Messina was used as suggested by Messina. (*Id.* at 78).

Mr. Fulmer testifies that there is nothing in Messina, or in any of the prior art cited by Hertzog, which suggests that the use of excess acetone has a detrimental effect on the

decomposition of CHP. (*Id.* at ¶ 63). Mr. Fulmer also testifies that there is nothing in Messina, or in any of the prior art cited by Hertzog, which suggests that the use of excess acetone has a detrimental effect on the formation or decomposition of DCP. (*Id.* at ¶ 65).

Under cross-examination, Dr. Levy testified that Messina did not disclose any interference by excess acetone on the formation or decomposition of DCP. (ZX 2047, Levy Tr. 423:20-424:10). Further, under cross-examination, Mr. Gutzait testified that he could not recall any teachings in 1989 indicating that excess acetone would interfere with the decomposition of DCP. (ZX 2048, Gutzait Tr. 118:6-9).

Zakoshansky has provided credible evidence that one of ordinary skill in the art would have possessed a reasonable expectation of success that AMS yields would increase when excess acetone was employed in the Sifniades process as suggested by Messina. Specifically, we credit the testimony of Mr. Fulmer and the cross-examination testimony of Dr. Levy and Mr. Gutzait on this issue.

vi. Hertzog Claims 7-8, 10-28, 33-35, 37, 39-41 and 43 are Obvious over the Teachings of Sifniades and Messina

Zakoshansky alleges that each element of Hertzog claims 7-8, 10-28, 33-35, 37, 39-41 and 43 is taught or suggested by the prior art. (Paper Nos. 40 and 46, claim charts). Hertzog does not contest Zakoshansky's contention that the prior art discloses each element of the disputed claims. (Papers Nos. 60 and 62). Based upon the evidence presented, we find that each limitation of Hertzog claims 7-8, 10-28, 33-35, 37, 39-41 and 43 is taught or suggested by the

prior art, such as Sifniades and Messina, as it would be understood by one of ordinary skill in the art.

Zakoshansky states that the question of whether or not these Hertzog claims are obvious “turns on whether the prior art provides a suggestion or motivation to combine the collective disclosures of Sifniades and Messina.” (Paper Nos. 40 and 46, p. 20). While Hertzog disputes this allegation, for the reasons provided above, we conclude that one of ordinary skill in the art reading Sifniades and Messina would have been motivated to combine these references to arrive at Hertzog’s claimed invention and would have had a reasonable expectation of success.

Zakoshansky, as the moving party, bears the burden of proof of establishing that it is entitled to the relief requested. Zakoshansky has met this burden. We hold that Hertzog claims 7-8, 10-28, 33-37, 39-41 and 43 are unpatentable under 35 U.S.C. § 103.

vii. Hertzog Claims 9, 30, 38 and 42

Zakoshansky alleges that each limitation in Hertzog claims 9, 30, 38 and 42 is taught or suggested by the prior art. (Paper Nos. 40 and 46, claim charts). Each of these claims recites specific proportions of components. For example, Hertzog claim 9 reads as follows:

9. The method in accordance with claim 8, wherein a cumene oxidation product feed stream and an acetone solution recycle stream are pumped into said decomposition reactor, wherein said oxidation product contains 81.6 wt% cumene hydroperoxide (CHP), 5.00 wt% dimethylphenyl carbinol (DMPC) and 0.40 wt% acetophenone, the balance being mostly cumene; wherein said acetone solution contains 0.86 wt% alpha methyl styrene (AMS), 2.06 wt% phenol, 5.83 wt% cumene, 1.60 wt% water and 0.0512 wt% sulfuric acid; wherein said cumene oxidation product feed stream is continuously introduced into said decomposition reactor at a rate of 1.62 parts by weight per minute; and wherein said acetone solution recycle stream is continuously introduced into said decomposition reactor

at a rate of 0.230 parts by weight per minute.

(Hertzog Pending and Proposed Claims, Paper No. 104). Regarding the specific percentages recited in Hertzog claim 9, Zakoshansky states:

Hertzog provides no data or any other evidence for an argument that claim 9 is patentable over Sifniades and Messina on the basis of the specific numerical limitations contained in claim 9.

(Paper No. 40, claim chart). For this proposition, Zakoshansky relies upon the testimony of Mr. Fulmer who testifies that:

Hertzog provides no data or any other evidence for an argument that claims 9, 30, 38 and 42 are patentable over Sifniades and Messina on the basis of the specific numerical limitations contained in those claims.

(ZX 2001, ¶101).

Zakoshansky, as the moving party, bears the burden of proof of establishing that it is entitled to the relief requested. As part of this burden, Zakoshansky, not Hertzog, must demonstrate by a preponderance of the evidence that the prior art teaches or suggests each limitation in the disputed Hertzog claims. Zakoshansky may not shift this burden onto Hertzog and require that Hertzog demonstrate the patentability of the limitations recited in Hertzog's own claims. Based upon the evidence presented, we hold that Zakoshansky fails to demonstrate where Sifniades or Messina suggests the particular numerical limitations recited in Hertzog claims 9, 30, 38 and 42.

viii. Hertzog Claims 32 and 36 are Obvious over the Combination of Sifniades and Messina

A drafting mistake was made in Zakoshansky Preliminary Motions 1 and 3. Zakoshansky Preliminary Motion 1 identifies Hertzog claim 32 as anticipated by Sifniades and Zakoshansky Preliminary Motion 3 identifies Hertzog claim 36 as anticipated Sifniades. (Paper Nos. 40 and 46). Attached to Zakoshansky Preliminary Motions 1 and 3 are expanded claim charts that identify the specific allegations raised by Zakoshansky regarding Hertzog's disputed claims. As to claims 32 and 36, Zakoshansky's expanded claim charts state that the claims are anticipated but they identify Messina as the basis for alleging that the use of excess acetone in a CHP decomposition process was known in the prior art. Also, the charts direct our attention to Mr. Fulmer's declaration (ZX 2001) where Mr. Fulmer relies on Messina as teaching the use of excess acetone in a CHP decomposition reaction. (ZX 2001, ¶¶ 64-66).

Zakoshansky's drafting mistake, alleging anticipation but identifying the combined teachings of Sifniades and Messina as the basis for unpatentability, is understandable on this record. Specifically, after the interference was declared, Hertzog filed an unopposed amendment to Hertzog claims 32 and 36 on September 5, 2002. (Hertzog Complete Set of Pending and Proposed Claims, Paper No. 104). Hertzog amended claims 32 and 36 to recite that the CHP decomposition is conducted in the presence of 10 to 100 percent excess acetone relative to the amount of acetone produced during the reaction.

As apparent from the record, Zakoshansky has consistently taken the position that, to the extent Hertzog's claims are supported by Hertzog's specification, Sifniades teaches all material limitations of Hertzog's claims with the exception of excess acetone, which is taught by Messina. Zakoshansky's allegations of anticipation as to Hertzog claims 32 and 36 appear directed to the

unamended claims 32 and 36 whereas Zakoshansky's allegation that Messina teaches the use of excess acetone addresses Hertzog's amended claims 32 and 36.

Hertzog's oppositions to Zakoshansky Preliminary Motions 1 and 3 attempt to refute Zakoshansky's allegations of obviousness as to Hertzog claims 32 and 36 by noting that the claims require the presence of excess acetone. Further, Hertzog's oppositions provide a detailed discussion of Hertzog's position regarding Sifniades CHP process and Messina's teaching of excess acetone.

Based upon the specific facts before us, we conclude that Zakoshansky's preliminary motions provide adequate notice to Hertzog that Zakoshansky believes that Hertzog's claims are either anticipated by Sifniades or rendered obvious by the combination of Sifniades and Messina. Hertzog has responded to these allegations. Accordingly, we exercise our discretion and review whether Hertzog claims 32 and 36 are obvious over the combined teachings of Sifniades and Messina.

Hertzog claim 36 is generally directed to an improved method for enhancing decomposition of CHP by decomposing the cumene in an excess of acetone and wherein additional water is introduced into the CHP reactor. As to introducing additional water, Sifniades teaches that:

Water is desirably added to the back-mix [CHP decomposition] reactor in addition to that formed by the desired reaction of DMPC with CHP to form DCP, by other condensation of DMPC or by the dehydration of DMPC to form AMS.

(ZX 2006, col. 4, lines 12-16). Further, as discussed in detail above, we conclude that one skilled in the art reading Sifniades and Messina would have been motivated to combine the

references and employ excess acetone, such as 59% excess acetone, in the Sifniades CHP decomposition reaction. As such, we hold that Zakoshansky provides sufficient and credible evidence that Hertzog claim 36 would have been obvious to one of ordinary skill in the art.

Hertzog claim 32, as with claim 36, is generally directed to an improved process of decomposing CHP wherein excess acetone is used. Hertzog claim 32, unlike claim 36, requires that the CHP be decomposed in a multiplicity of sequential reactors with a portion of the outlet stream of a back-mixed reactor passed to a plug flow reactor of smaller size compared to the CHP decomposition reactors with the smaller plug flow reactor decomposing essentially all of the CHP remaining in the outlet stream.

We are not convinced that Sifniades or Hertzog provide a sufficient written description for Hertzog's claimed multiplicity of reactors where a *portion* of the outlet stream is sent to a plug flow reactor to further decompose the CHP. Yet, to the extent this limitation is described by Hertzog, it is likewise described by Sifniades as Sifniades describes and depicts the same back-mix reactor vessel connected to the same cooler, plug-flow CHP cleanup reactor and DCP reactor. (Compare Sifniades, ZX 2006, Fig. 1 and Hertzog '190, HX 1027, Fig. 1). Accordingly, we find that, if Hertzog is found to provide a sufficient written description of the invention recited in Hertzog claim 32, then Hertzog claim 32 is unpatentable over the combined teachings of Sifniades and Messina.

c. Summary of Decision on Zakoshansky Preliminary Motions 1 & 3
as Applied to Hertzog's Claims

To summarize, Zakoshansky provides credible and sufficient evidence to demonstrate by a preponderance of the evidence that Hertzog claims 29 and 31 are anticipated by Sifniades and that Hertzog claims 7-8, 10-28, 33-37, 39-41 and 43 are obvious over the combined teachings of Sifniades and Messina. Further, Hertzog claim 32 is, to the extent the claim is described by Hertzog's involved '190 application, unpatentable as obvious over the combined teachings of Sifniades and Messina. Zakoshansky fails to provide sufficient and credible evidence demonstrating that Hertzog claims 9, 30, 38 and 42 are unpatentable over the prior art. Accordingly, Zakoshansky Preliminary Motions 1 and 3 are *granted-in-part* with respect to Hertzog claims 7-8, 10-29, 31-37, 39-41 and 43 and denied with respect to Hertzog claims 9, 30, 38 and 42.

3. Analysis of Zakoshansky's Claims in light of Prior Art Relied Upon in
Zakoshansky Preliminary Motions 1 and 3

Where a party files a preliminary motion alleging unpatentability of an opponent's claims over prior art, there is a presumption that the relied upon prior art is also applicable to the party filing the motion unless the motion includes an explanation, and any necessary evidence, as to why the prior art does not apply to the filing party. 37 C.F.R. §1.637(a).¹⁰

¹⁰See new rule 37 C.F.R. 41.207(c), identifying presumption that prior art relied upon by movant against opponent's corresponding claims also renders movant's corresponding claims unpatentable.

Zakoshansky Preliminary Motions 1 and 3 allege that Zakoshansky's claims are patentable, with the possible exception of claims 21 and 39, over the prior art relied upon therein. Zakoshansky identifies the following five alleged features that are missing from Sifniades and Messina and the Zakoshansky claims containing these features as follows:

Zakoshansky Reissue Claim Nos.	Alleged Feature Missing from Sifniades and Messina
4, 30-31	"A multiplicity of separate sequential reactors each with a controlled temperature range"
1-10, 37-38	"in a non-isothermal manner"
2, 40-41	"thoroughly mix[es] [the recycled excess acetone] with the cumene hydroperoxide feedstream"
33-36	"recycles the cumene hydroperoxide decomposition products to a cumene hydroperoxide feedstream"
11-20, 22-29	mild reaction conditions for DCP decomposition - <i>e.g.</i> , "at a temperature of from 80° to 110 °C.," "amine suitable for partially neutralizing the acidic materials," "weaker acidic catalyst medium," or the like.

(Paper No. 40, p. 22, Paper No. 46, pp. 21-22). Provided below is an analysis of Zakoshansky's arguments in support of the patentability of its claims over Sifniades and Messina.

a. Zakoshansky Claims 21 and 39

Many of Hertzog's involved claims have been held unpatentable over the prior art cited in Zakoshansky Preliminary Motions 1 and 3. As to Zakoshansky claims 21 and 39, Zakoshansky, in its Preliminary Motions 1 and 3, concedes that if Hertzog's claims are rendered unpatentable

over the prior art, then Zakoshansky claims 21 and 39 are likewise unpatentable over the prior art. (Paper No. 40, p. 23 and Paper No. 46, p. 22).

Zakoshansky claim 21 is generally directed to a composition containing CHP, cumene, acidic catalyst, DCP, DMBA, phenol and acetone, wherein the acetone is present in a molar ratio to phenol ranging from 1.15:1 to 1.4:1. Zakoshansky claim 39 generally describes a method for generating excess acetone by decomposing DCP to phenol acetone and AMS and recycling the acetone to a CHP decomposition reaction.

Sifniades describes a process wherein CHP undergoes acid catalyzed decomposition to phenol, acetone and AMS wherein the process also involves converting DMBA to DCP and then converting the DCP to AMS, phenol and acetone. (ZX 2006, abstract). Messina has been relied upon by Zakoshansky for the proposition that it would have been obvious to one of ordinary skill in the art to employ excess acetone in the process of Sifniades in the form of a recycle stream to the CHP decomposition reaction. (Paper Nos. 40 and 46).

Based upon the evidence of record, we conclude that Zakoshansky has failed to refute the presumption that the prior art it relies upon as rendering Hertzog's claims unpatentable also renders its claims 21 and 39 unpatentable. We conclude that Zakoshansky claims 21 and 39 are unpatentable over the prior art cited in Zakoshansky Preliminary Motions 1 and 3.

b. Multiplicity of Separate Sequential Reactors Each with a Controlled Temperature Range (Claims 4 and 30-31)

Zakoshansky argues that Sifniades and Messina fail to teach or suggest the use of multiple separate sequential CHP decomposition reactors wherein each CHP decomposition

reactor has a controlled temperature range. (Paper No. 40, pp. 22-23 and Paper No. 46, pp. 21-22). Zakoshansky relies upon ¶¶ 85-89 of Mr. Fulmer's first declaration (ZX 2001) to support its allegation. Hertzog disagrees with Zakoshansky and argues that Zakoshansky's allegedly distinguishing features were known in the prior art. (Paper No. 60, p. 23 and Paper No. 62, p. 22).

Mr. Fulmer testifies that Zakoshansky's CHP cleavage step does not occur in a single reactor but in a multiplicity of reactors. Mr. Fulmer directs our attention to a portion of Zakoshansky's specification which states:

The actual CHP cleavage reaction initially stated [wherein CHP is decomposed into phenol and acetone and DCP is made from the reaction of CHP and DMBA] is carried out in a non-isothermal manner and preferably in a multiplicity of sequential reactors, for example a shell-in-tube reactor, generally two to five reactors, particularly three, wherein temperature is maintained over a specific range for each reactor thereby obtaining optimal CHP conversion profile and yield. This entire first reaction is controlled by a plug-flow mini-reactor wherein the measurement of temperature difference at the inlet and outlet of the mini reactor is maintained in a certain range.

(ZX 2003, col. 2, lines 24-35).¹¹

¹¹Mr. Fulmer's testimony regarding multiplicity of reactors (ZX 2001, ¶ 85) directs our attention to several portions of Zakoshansky's specification that, on their face, are not directly related to Zakoshansky's multiplicity of reactors. For example, Mr. Fulmer cites ZX 2003, col. 4, lines 6-7 for Zakoshansky's multiplicity of reactors, yet this portion of Zakoshansky's specification is part of a sentence that states:

A further aspect of the invention is a method for enhancing the decomposition of CHP to phenol and acetone which comprises having additional water in the CHP decomposition reactor.

(ZX 2003, col. 4, lines 4-7).

Mr. Fulmer provides a narrow interpretation for the term “multiplicity of reactors” as it appears in Zakoshansky’s claims. Mr. Fulmer testifies that, as shown in Zakoshansky examples 9-11, likely 35 or 30% of Zakoshansky’s CHP decomposition occurs in a first reactor, 30-40% in a second reactor and 10-15% occurs in a third reactor. (ZX 2001, ¶ 85). Mr. Fulmer distinguishes this CHP decomposition from that of Sifniades where, according to Mr. Fulmer, 95% or more of the CHP cleavage step occurs in a single reactor with any remainder occurring in a cleanup tube reactor or in the DCP decomposition reactor. (*Id.*). Mr. Fulmer also testifies that Zakoshansky’s CHP decomposition takes place under plug flow conditions whereas Sifniades’ CHP decomposition occurs in a back-mix reactor. (*Id.*).

Although the written description may aid in the proper construction of a claim term, limitations, examples or embodiments appearing only therein may not be read into the claims. *Kraft Foods Inc. v. International Trading Co.*, 203 F.3d 1362, 1366, 53 USPQ2d 1814, 1817 (Fed. Cir. 2000). Thus, we “cannot construe the claim to add a limitation not present in the claim itself.” *Hewlett-Packard Co. v. Mustek Systems Inc.*, 340 F.3d 1314, 1325, 67 USPQ2d 1825, 1832 (Fed. Cir. 2003); *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1325, 65 USPQ2d 1385, 1392-93 (Fed. Cir. 2003) (“Because the claims are best understood in light of the specification of which they are a part, however, courts must take extreme care when ascertaining the proper scope of the claims, lest they simultaneously import into the claims limitations that were unintended by the patentee.”). This is especially true for applicants as an applicant can resolve any ambiguity by amending the claim to contain the proposed limitations from the specification.

Mr. Fulmer fails to identify where Zakoshansky defines the terminology “multiplicity of reactors” as limited to three plug flow reactors where specific proportions of CHP are decomposed. We note that Zakoshansky’s specification states that a multiplicity of reactors is “generally” two to five reactors and “for example” is a shell-in-tube reactor. (ZX 2003, col. 2, lines 24-28). Further, the proportions of CHP decomposition referred to by Mr. Fulmer’s testimony are taken from Zakoshansky’s examples, which Zakoshansky’s specification states “are not intended to limit the invention but are intended illustratively to exemplify the invention.” (ZX 2003, col. 7, lines 58-60). We conclude that the broadest reasonable construction of Zakoshansky’s multiplicity of reactors encompasses two or more reactors and is not limited to a specific reactor design or proportions of CHP decomposed within each reactor.

Sifniades describes a CHP decomposition reaction where the CHP is decomposed in a back-mix reactor to a level of between 0.5% to 5% CHP and this residual CHP is decomposed in a plug flow reactor to level below 0.4%. (ZX 2006, col. 3, lines 63-68 and col. 4, lines 56-65). The two CHP reactors employed in the Sifniades process constitute a “multiplicity of reactors” as the term is defined by Zakoshansky. Further, the temperature of the “second” CHP decomposition reactor, tube 6, ranges from 50 to 90°C. and is designed to be approximately that of CHP decomposition back-mix reactor, which is maintained at a temperature ranging from 50 to 90°C. (HX 1004, col. 2, lines 19-39 and col. 5, lines 25-26). Accordingly, we conclude that Zakoshansky’s multiplicity of reactors does not distinguish over the Sifniades process. We therefore conclude that Zakoshansky claims 4, 30 and 31 are unpatentable over the prior art cited in Zakoshansky Preliminary Motions 1 and 3.

c. Non-isothermal Manner (Claims 1-10 and 37-38)

Zakoshansky's expert, Mr. Fulmer, testifies that Zakoshansky conducts its CHP cleavage reaction in a non-isothermal manner. (ZX 2001, ¶ 86). Mr. Fulmer distinguishes the Sifniades process from that of Zakoshansky by referring to Zakoshansky's description of three sequential reactors where:

The temperature of the reactions among the three sequentially placed reactors are about 50° to 62° C. first, about 62° to 57° C. second, and about 57° to 50° C. third.

(*Id.* citing ZX 2003, col. 5, lines 13-15).

Again, Mr. Fulmer's testimony seeks to place undue restrictions upon Zakoshansky's claim terminology. As mentioned above, Zakoshansky describes three sequential reactors as a preferred embodiment. Further, as to the temperatures within the sequential reactors, we note that Zakoshansky's specification states that:

As previously mentioned it is preferred to run the initial cleavage reaction in a multiplicity of reactors in sequence. Generally, the temperature can vary from about 45° C. to about 74° C.

(ZX 2003, col. 4, lines 54-57). Accordingly, Zakoshansky's specification does not limit the three sequential reactors to the particularly defined temperature ranges identified by Mr. Fulmer.

Zakoshansky's specification identifies the three sequential reactors with temperature ranges of about 50° to 62° C., about 62° to 57° C., and about 57° to 50° C. as non-isothermal. (ZX 2003, col. 5, lines 13-18). Zakoshansky thus identifies the temperature difference of about 62° to 57° C. in the second reactor as non-isothermal. Accordingly, a temperature variance of about 5° C., and possibly smaller, is defined as non-isothermal by Zakoshansky.

We note that Zakoshansky's counsel attempts to define non-isothermal based upon the intent of the artisan designing the process. (Paper No. 107, p. 30, lines 10-22). We decline to adopt such an intent based claim interpretation.

i. The Sifniades Back-Mix Reactor

Sifniades describes a CHP decomposition process employing a back-mix reactor connected to a plug flow reactor that further decomposes the residual CHP from the back-mix reactor. Sifniades states that the back-mix reactor CHP decomposition is conducted at a temperature of between 50° C. to about 90° C. (ZX 2006, col. 2, lines 26-29). Sifniades states that the plug flow reactor is "maintained at a temperature which is roughly equal to that of the first [CHP decomposition] reactor." (*Id.* at col. 4, lines 58-60). Sifniades also states that:

The temperature in tube 6 [plug flow reactor] is approximately the same as in 1 [backmix CHP decomposition reactor]. No means for cooling is provided [for the plug flow reactor], because the only significant reaction taking place is the decomposition of residual CHP which has already been reduced to 0.5-5% level in step (a).

(*Id.* at col. 5, lines 25-30).

In discussing Hertzog's invention, Mr. Fulmer testifies that the term isothermal means constant temperature and distinguishes Zakoshansky's invention based upon Zakoshansky's use of temperature gradients. (ZX 2001, ¶ 126). Sifniades first CHP reactor is a back-mix reactor. Levenspiel (ZX 2015) defines back-mix reactors as ideally well-stirred and uniform throughout and notes that the design of "real reactors" attempts to approach this ideal. (ZX 2015, pp. 97-98). Mr. Fulmer's testimony fails to demonstrate properly that the Sifniades back-mix reactor

achieves the ideal steady-state flow where the contents are well stirred and uniform throughout. Accordingly, Mr. Fulmer's testimony fails to distinguish Sifniades' back-mix reactor from Zakoshansky's reactors on the basis of the "non-isothermal" terminology.

Additionally, we note that Mr. Fulmer fails to explain whether or not the temperature at the Sifniades back-mix reactor inlet stream is the same temperature as the outlet stream leaving the back-mix reactor. If the temperature between the inlet and outlet streams differ, the Sifniades back-mix reactor could be considered non-isothermal as a temperature gradient would exist between the inlet and outlet.

ii. The Sifniades Plug Flow CHP Cleanup Reactor

CHP decomposition is highly exothermic. (ZX 2006, col. 5, lines 9-12). During oral argument, Zakoshansky's counsel admitted that there may be a slight temperature change in Sifniades' plug flow clean-up reactor due to the decomposition of the CHP. (Paper No. 107, p. 50, line 10 to p. 51, line 8).¹² As the residual CHP decomposes in a highly exothermic manner in the Sifniades plug flow cleanup reactor, and as this exothermic reaction may create a temperature gradient in the reactor, there is a question as to whether or not this plug flow reactor is isothermal or non-isothermal.

A conventional definition of the term "isothermal" is constant temperature. (See, ZX 2001, ¶ 126). The plug flow CHP cleanup reactor in Sifniades appears to possess a temperature

¹²We note that, while not "prior art," a later publication by Zakoshansky's company identifies a CHP decomposition process having a 7° C. temperature rise for each weight percent CHP. (HX 1016, p. 8, ¶ 3; Paper No. 31, ¶ 7 and Paper No. 52, ¶ 7).

gradient, albeit slight, arising from the exothermic nature of the decomposition of the residual CHP. A rebuttable presumption exists that the prior art relied upon by Zakoshansky as demonstrating the unpatentability of Hertzog's corresponding claims, likewise renders Zakoshansky's corresponding claims unpatentable. As such, Zakoshansky has the burden of demonstrating that one of ordinary skill in the art would understand that the disputed Sifniades plug flow reactor does not possess a sufficient enough temperature gradient to be considered "non-isothermal" as that term is used by Zakoshansky's specification and claims. On the record presented, Zakoshansky fails to meet its burden and distinguish the Sifniades plug flow CHP reactor from Zakoshansky's "non-isothermal" reactors.

iii. Three Separate Sequential Reactors with Temperature Gradients of 50° to 62° C., 62° to 57° C., and 57° to 50° C.

Mr. Fulmer states that Zakoshansky's CHP cleavage process is conducted in a non-isothermal manner and identifies the cleavage process as conducted in three sequential reactors with temperature gradients of 50° to 62° C., about 62° to 57° C., and about 57° to 50° C. (ZX 2001, ¶ 86). Mr. Fulmer testifies that Sifniades does not teach this temperature gradient. (*Id.*).

While not specifically identified by Zakoshansky, Zakoshansky claim 5 is a dependent claim that limits the CHP decomposition method of Zakoshansky claim 4 to a process where a first reactor has a temperature range of about 50° to 62° C., a second reactor having a range of about 62° to 57° C., and a third reactor with a range of about 57° to 50° C. (Paper No. 105). We credit the testimony of Mr. Fulmer as to Zakoshansky claim 5 and conclude that Sifniades, alone or in combination with Messina, fails to teach or suggest a CHP decomposition reaction process

having three sequential reactors with the recited temperature ranges.

d. Mixing Recycled Acetone with CHP Feedstream (Claims 2 and 40-41)

Zakoshansky relies upon ¶¶ 85-89 of Mr. Fulmer's declaration to distinguish its claims from the teachings of Sifniades and Messina. In particular, Mr. Fulmer testifies that Zakoshansky thoroughly mixes recycled acetone with the CHP feedstream "before they are added to his first CHP cleavage reactor." (ZX 2001, ¶ 87). Mr. Fulmer's testimony goes on to distinguish "Hertzog's" process,¹³ which "does not mix the acetone or anything else with the CHP feedstream before entry to the reactor." (*Id.*).

Zakoshansky claims 2 and 40-41 are said to be distinguished from the prior art by the thorough mixing of the excess acetone with the CHP feedstream before their entry into a CHP decomposition reactor. Zakoshansky claim 40 specifically states that the acetone is thoroughly mixed with the CHP feed "prior to the entrance" to the CHP decomposition reactor. (Paper No. 105). Similarly, claim 41 requires that the acetone is thoroughly mixed with the CHP feedstream with the aid of an "in line mixer." Neither Sifniades nor Messina specifically teach thoroughly mixing the acetone with the CHP feedstream prior to their entrance into the CHP decomposition reactor. Therefore, as to Zakoshansky claims 40 and 41, we credit Mr. Fulmer's testimony and conclude that Zakoshansky distinguishes over the prior art cited in Zakoshansky Preliminary Motions 1 and 3.

¹³On this issue, we interpret Mr. Fulmer's testimony as directed to both the Hertzog process and the Sifniades process as Mr. Fulmer testifies that the Hertzog process combines Sifniades process with the excess acetone of Messina. (See, ZX 2001, ¶ 68).

Zakoshansky claim 2 requires that the acetone is thoroughly mixed with the CHP feedstream and does not mention that the mixing is conducted prior to entering the CHP decomposition reactor. Thus, claim 2 encompasses mixing the acetone with the CHP feedstream inside the reactor. Yet, Mr. Fulmer alleges that Zakoshansky's process departs from the teachings of Sifniades as Zakoshansky's process is directed to "premixing" and cites to various portions of Zakoshansky's specification including Zakoshansky Examples 5 and 6 where Zakoshansky states that premixing provides better CHP decomposition rates. (ZX 2001, ¶¶ 84, 87).

Zakoshansky's specification contains "specific examples of the invention." (ZX 2003, col. 7, line 58). Zakoshansky examples 5 and 6 are said to carry out the decomposition of technical CHP with preliminary mixing and without preliminary mixing of technical CHP and recycled products. (*Id.* at col. 8, lines 43-47). Zakoshansky's specification states that the "given examples" demonstrate an increase in CHP decomposition with preliminary mixing by up to 20% relative to examples without preliminary mixing. (*Id.* at col. 8, lines 56-60). We note that neither Zakoshansky example 5 or 6 is identified as a "comparative" example, unlike Zakoshansky example 18, which is entitled "Example 18 (Comparative)" and describes "comparative process conditions." We do not interpret Zakoshansky's specification as limited to processes that premix the technical CHP with recycled products, *e.g.*, acetone, as Zakoshansky identifies the "without preliminary mixing" process as an example and its examples are said to be "specific examples of the invention."

Additionally, we note that Zakoshansky claims 40 and 41 specifically discuss recycling acetone to a CHP decomposition reaction “where it is thoroughly mixed with the cumene hydroperoxide feed prior to the entrance to the cumene hydroperoxide decomposition reactor.” If Zakoshansky is correct and the term “thoroughly mixing” implicitly requires mixing the acetone and CHP feed prior to entering the CHP decomposition reactor, then the “prior to the entrance” recitation in Zakoshansky claims 40 and 41 appears superfluous.

We conclude that Mr. Fulmer fails to provide a sufficient and credible explanation as to why Zakoshansky’s specification *requires* the acetone to be mixed prior to entering the CHP decomposition reactor such that we would read this limitation into claim 2. Based upon the evidence presented, we construe Zakoshansky claim 2 as encompassing the mixing of the CHP feedstream and acetone in the CHP decomposition reactor. As such, Zakoshansky fails to distinguish its claim 2 from the teachings of Sifniades and Messina on the basis of an alleged premixing of the acetone with the CHP feedstream.

e. Recycle CHP Decomposition Products to CHP Feedstream (Claims 33-36)

Mr. Fulmer testifies that Zakoshansky’s invention is distinguishable from Sifniades on the basis that Zakoshansky recycles the CHP decomposition products to a CHP feedstream. According to Mr. Fulmer, Zakoshansky’s CHP recycle will dilute the CHP feed by 10 to 25 times. (ZX 2001, ¶ 88).

Sifniades does not identify a CHP product recycle stream for its CHP feedstream. We credit the testimony of Mr. Fulmer as to Zakoshansky claims 33-36, which specifically require

the CHP product recycle into a CHP feedstream. We hold that, on the evidence presented, Zakoshansky has met its burden of distinguishing the prior art relied upon in Zakoshansky Preliminary Motions 1 and 3 for Zakoshansky claims 33-36.

f. Mild Reaction Conditions for DCP Decomposition Process (Claims 11-20 and 22-29)

Mr. Fulmer testifies that Zakoshansky's DCP decomposition process is conducted under different process conditions than Sifniades. Specifically, Mr. Fulmer states that Zakoshansky employs a lower temperature, a weaker acidic catalyst and an amine reaction product. Mr. Fulmer testifies that Sifniades lacks these DCP decomposition process reaction conditions. (*Id.* at ¶ 89).

Zakoshansky claims 11-15 state that the DCP decomposition is carried out at a temperature of about 80° to 110° C. Sifniades employs a DCP decomposition temperature of from about 120° to about 150° C.

Zakoshansky claims 16-20 require that the DCP decomposition reaction be carried out in the presence of the reaction product of an acidic material catalyst, *e.g.*, sulfuric acid, and an amine, *e.g.*, ammonia, for partially neutralizing the acidic catalyst. Zakoshansky claims 22-26 recite a composition having a reaction product of an amine and an acid which catalyzes the decomposition of CHP. Zakoshansky claims 27 and 28 require that the DCP decomposition occurs in the presence of a weaker acidic catalyst than that used in the CHP decomposition process. Zakoshansky claim 29 requires that the quantity of strong acid catalyst of claim 27 be reduced in the DCP process through the addition of an amine. Sifniades is silent on the presence

of an amine and does not describe the use of a weaker catalyst in the DCP decomposition process.

We credit Dr. Fulmer's testimony that Zakoshansky claims 11-20 and 22-29 require different DCP decomposition process conditions and/or compositions than those discussed in the prior art cited in Zakoshansky Preliminary Motions 1 and 3. We conclude that Zakoshansky has met its burden of distinguishing its claims 11-20 and 22-29 from the prior art cited in its preliminary motions 1 and 3.

g. Summary and Observations regarding Zakoshansky's Claims Taken in Light of the Prior Art Relied Upon in Zakoshansky Preliminary Motions 1 and 3

There is a presumption that prior art relied upon by movant against opponent's corresponding claims also renders movant's corresponding claims unpatentable. In moving against Hertzog's corresponding claims, Zakoshansky bears the burden of establishing that Zakoshansky's claims are patentable over the art relied upon. Zakoshansky fails to meet this burden with respect to Zakoshansky claims 1-4, 6-10, 21, 30-31, and 37-39. Accordingly, we hold that Zakoshansky claims 1-4, 6-10, 21, 30-31, and 37-39 are unpatentable over the prior art relied upon in Zakoshansky Preliminary Motions 1 and 3.

In analyzing the patentability of Zakoshansky's claims over the prior art cited in its preliminary motions, we gave little weight to the comments provided by Hertzog in Hertzog's oppositions to Zakoshansky's motions. Specifically, Hertzog's oppositions amounted to conclusory statements of counsel that fail to identify adequately supporting evidence of record. For example, in arguing that Zakoshansky's claims are unpatentable over the prior art relied upon

over Sifniades and Messina, Hertzog Opposition 3 states:

Although not a part of the relief requested in [Zakoshansky] Preliminary Motion 1, Zakoshansky asserts that a number of his claims are patentably distinct from both Hertzog's claims and the prior art based on five alleged "distinguishing features." Zakoshansky is wrong. First as shown in Hertzog Preliminary Motions 1-3, none of Zakoshansky's claims are patentable to Zakoshansky under either 35 U.S.C. §§ 102(d)/103(a) based on his Soviet Author's Certificates or § 112 ¶ 1 based on his failure to disclose the best mode for carrying out his process.

In addition, as shown in Hertzog's Opposition to Zakoshansky Preliminary Motions 2 and 4, all four of Zakoshansky's alleged "distinguishing features" relating to the first-stage CHP decomposition would be disclosed and enabled to one of ordinary skill in the art reading Hertzog's claims and written description. Further, as shown in Hertzog's Opposition to Zakoshansky's Preliminary Motion No. 5, Zakoshansky's four alleged "distinguishing features" relating to first-stage CHP decomposition are all features that were well known to one of ordinary skill in the art more than 1 year prior to the filing date of the '092 application.

Finally, as shown in Hertzog's Oppositions to Zakoshansky's Preliminary Motions No. 2 and 6, Zakoshansky's alleged "distinguishing feature" relating to the second-stage DCP decomposition constitutes reaction conditions that substantially overlap those disclosed and claimed by Hertzog and are merely an optimization of parameters well known to one of ordinary skill in the art more than 1 year prior to the filing date of the '092 application. Thus, none of these five features are either patentable to Zakoshansky or patentably distinct.

(Paper No. 62, pp. 21-22).

We remind Hertzog that the Standing Order, Paper No. 2, explicitly states that

"[a]rguments presented in one paper shall not be incorporated by reference to another paper."

(Paper No. 2, ¶ 13). Hertzog's repeated reference to other Hertzog oppositions as demonstrating the obviousness of certain Zakoshansky features over the prior art fails to provide adequate notice to Zakoshansky and the Board as to which arguments and evidence are to be applied against which specific Zakoshansky claims. For example, Hertzog argues that its Oppositions 2 and 4 demonstrate that Hertzog's claims are enabled and described by reading Hertzog's

specification and claims but Hertzog fails to explain how this is related to a determination that Zakoshansky's claims are unpatentable over Sifniades and Messina.

Conversely, Zakoshansky Preliminary Motions 1 and 3 identify and rely upon five (5) features to distinguish its claims over the prior art relied upon therein. We will not undertake an independent analysis of Zakoshansky's claims to determine whether the claims recite additional distinguishing characteristics that could have been relied upon. *Compare Ernst Haas Studio, Inc. v. Palm Press, Inc.*, 164 F.3d 110, 111-12, 49 USPQ2d 1377, 1379 (2d Cir. 1999) (Declining to scour the record and serve as advocate for a party).

B. Zakoshansky Preliminary Motion 2: Request that Certain Hertzog Claims Be Held Unpatentable for Lack of Sufficient Written Description, 35 U.S.C. §112, 1st para

Zakoshansky Preliminary Motion 2 (Paper No. 39) alleges that Hertzog claims 8-13, 15-26, 31-35, 37-38 and 40-42 lack sufficient written description. According to Zakoshansky, Hertzog does not provide written description of:

- i) Multiplicity of Reactors Each Having a Controlled Temperature Range (Claims 8-10, 12-13, 15-22, 25, 32, 37-38 and 40-42)
- ii) Non-isothermal (Claims 8-10, 12-13, 15-22, 25, 32, 37-38 and 40-42)
- iii) Back-mixed Reactor Outlet Stream (Hertzog Claim 32)
- iv) Thoroughly Mixed and Recycling CHP Decomposition Products to a CHP Feedstream (Claims 11-13, 23-25 and 33-35)
- v) DCP Decomposition Temperature of Greater than 90° C. (Claims 26 and 31)

(Paper No. 39, see headings on pp. 20-23 and ¶ 23-28). Hertzog opposes Zakoshansky's request and argues that one skilled in the art would understand that the specification provides sufficient written descriptive support for the subject matter claimed by Hertzog. (Paper No. 61).

While the specifics of the cases concerning adequate written description vary, the cases agree that the inquiry is *factual* and must be assessed on a *case-by-case* basis. Moreover, because of the fact-sensitive nature of the written description inquiry, the Federal Circuit has advised against misapplication of precedent in this area. See, *Union Oil Co. of California v. Atlantic Richfield Co.*, 208 F.3d 989, 1000, 54 USPQ2d 1227, 1235 (Fed. Cir. 2000); *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562, 19 USPQ2d 1111, 1116 (Fed. Cir. 1991); and, *In re Driscoll*, 562 F.2d 1245, 1250, 195 USPQ 434, 438 (CCPA 1977).

The purpose of the written description requirement is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by the inventor. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d at 1563, 19 USPQ2d at 1116. The inventor can demonstrate possession by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention. The inventor, however, needs to show that the inventor was "in possession" of the invention by describing the invention, with all its claimed limitations, not that which makes it obvious. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1571-72, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997).

The disclosure as originally filed does not have to provide *ipsis verbis* support for the claimed subject matter at issue. *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323, 56 USPQ2d 1481, 1483 (Fed. Cir. 2000); *Fujikawa v. Wattanasin*, 93 F.3d 1559, 1570, 39 USPQ2d 1895, 1904 (Fed. Cir. 1996). Rather, if the written description does not use precisely the same terms used in a claim, the question then is whether the specification directs or guides one skilled in the art to the subject matter claimed such that the specification reasonably conveys

to those skilled in the art that the inventor invented what is claimed. *See, e.g., Fujikawa v. Wattanasin*, 93 F.3d at 1570, 39 USPQ2d at 1904 (Fed. Cir. 1996); *Vas-Cath*, 935 F.2d at 1563, 19 USPQ2d at 1116 (Fed. Cir. 1991); *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989).

i. Multiplicity of Reactors Each Having a Controlled Temperature Range

Zakoshansky alleges that Hertzog's specification does not describe a multiplicity of reactors each having a controlled temperature range. (Paper No. 39, ¶¶ 17-20, and pp. 20-22). According to Zakoshansky, the purpose of Hertzog's cleanup reactor is to remove small amounts of CHP maintained in the CHP cleavage reactor. (*Id.* at ¶ 19). Zakoshansky states that Hertzog's cleanup reactor, tube 7, decomposes a maximum of 3 percent of the CHP and has no temperature control. (*Id.*). Zakoshansky agrees that Hertzog's back-mix reactor decomposes CHP and counts towards a multiplicity of reactors, but concludes that the cleanup function of Hertzog's cleanup reactor is not the purpose of the multiplicity of reactors disclosed by Zakoshansky. (*Id.* at ¶¶ 19-20).

Zakoshansky fails to explain how Hertzog's alleged failure to describe Zakoshansky's claimed multiplicity of reactors demonstrates a lack of written description for Hertzog's claimed multiplicity of reactors. A claim will be construed in light of the specification of the application in which it resides. 37 C.F.R. §1.633(a).¹⁴ Accordingly, we focus our discussion on whether or not Hertzog's specification, as understood by one of ordinary skill in the art, describes the

¹⁴*Cf.*, new rule 37 C.F.R. §41.202(a)(5).

invention claimed by Hertzog.

Hertzog claim 17 requires “a multiplicity of separate sequential reactors each with a controlled temperature range.” Claims 18 to 22 depend from claim 17.

As construed above, Hertzog’s claimed multiplicity of reactors includes both the back-mix reactor and “tube 7,” which Hertzog states can be used to decompose residual CHP. In a preferred embodiment of Hertzog’s invention, a CHP is decomposed in a back-mixed reactor 1, whose temperature is maintained by a cooler 6. (Hertzog ‘190, HX 1027, p. 8, line 33 to p. 9, line 3). Hertzog’s specification states that a preferred step includes reacting the reaction mixture from the back-mix reactor in a plug flow reactor at a temperature of between 50°C and 90°C. (Hertzog ‘190, HX 1027, p. 5, lines 12-18). Hertzog also discloses that “[t]he temperature in tube 7 is approximately the same as in [CHP decomposition reactor] 1.” (HX 1027, p. 9, lines 20-21). Accordingly, one of ordinary skill in the art would understand that the CHP decomposition process as well as the reactor tube 7 are designed such that temperature of reactor tube 1 will be approximately that of the back-mix reactor 1, *i.e.*, the temperature of reactor tube 7 will be controlled directly or indirectly such that the temperature is approximately that of back-mix reactor 1. Based upon the record presented, Zakoshansky fails to demonstrate by a preponderance of the evidence that Hertzog’s specification fails to describe a multiplicity of reactors, each of which is maintained within a desired temperature range. *Cf., Bilstad v. Wakalopulos*, 386 F.3d 1116, 1124-27, 72 USPQ2d 1785, 1791-93 (Fed. Cir. 2004).

ii. Non-isothermal

Zakoshansky alleges that Hertzog does not carry out its CHP decomposition reaction in a non-isothermal manner. (Paper No. 39, ¶¶ 21-22, and pp. 20-22). According to Zakoshansky, Hertzog attempts to avoid temperature gradients and warns against hot spots. (*Id.* at ¶ 21). Zakoshansky recognizes that Hertzog's back-mixed reactor may have temperature gradients but argues that these gradients are "of no value to Hertzog's process and may be dealt with by changing the 'reactor geometry and recirculation ratio.'" (*Id.*).

As discussed above, Hertzog's specification explicitly recognizes the existence of temperature gradients within the back-mix reactor. Hertzog's specification also explicitly states that the "magnitude" of the gradients will depend on the reactor geometry and recirculation ratio, and does not mention the elimination of the gradients. As to the averaging of the temperatures within the reactor, Zakoshansky fails to provide a sufficient and credible basis for concluding that averaging the high and low temperatures in Hertzog's back-mix reactor converts an otherwise non-isothermal process into an isothermal process.

We credit the testimony of Hertzog's expert, Mr. Gutziat, who testifies that the temperature gradients in Hertzog's back-mix reactor would be understood by one of ordinary skill in the art to be part of a non-isothermal reaction process. (HX 1030, ¶ 32). Based upon the evidence presented, we conclude that Zakoshansky fails to demonstrate by a preponderance of the evidence that Hertzog's specification lacks a sufficient written description of the claimed non-isothermal process.

iii. Back-mixed Reactor Outlet Stream (Hertzog Claim 32)

Hertzog claim 32 requires that a *portion* of the outlet stream of the back-mixed reactor be fed to a plug flow reactor of smaller size compared to the CHP decomposition reactors (plural). (*Id.*). The outlet stream from Hertzog's back-mix reactor flows into plug flow reactor tube 7, where the residual CHP is allowed to decompose. (Paper No. 39, ¶ 23, HX 1027, p. 9, lines 16-25). Hertzog claim 32 demonstrates the written description linguistic problems that arise from trying to copy claims.

Hertzog sends the back-mix products to tube 7. As stated by Zakoshansky, if the plug flow reactor tube 7 is a CHP reactor, then tube 7 could not be of "a smaller size compared to the cumene hydroperoxide decomposition reactors" as required by Hertzog claim 32. (*Id.*). Zakoshansky further notes that a *portion* of the back-mix reactor outlet stream of Hertzog claim 32 is passed to a plug flow reactor but Hertzog's specification describes passing the entire outlet stream from the back-mix reactor to a plug flow reactor. (*Id.* at ¶¶ 24 and 26). Zakoshansky's expert, Mr. Fulmer, testifies in support of Zakoshansky's allegations regarding Hertzog claim 32 and its lack of written descriptive support. (ZX 2001, ¶¶ 128 and 131).

We have reviewed Hertzog's Opposition to Zakoshansky Preliminary Motion 2 regarding the written descriptive support for the claimed subject matter of Hertzog claims but find it lacking in credibility as to Hertzog claim 32. (See, *e.g.*, Hertzog Opp. 2, Paper No. 61). Based upon the record presented, we find that Zakoshansky has demonstrated by a preponderance of the evidence that Hertzog claim 32 lacks written description.

iv. Thoroughly Mixed and Recycling CHP Decomposition Products to a CHP Feedstream

Zakoshansky argues that Hertzog's specification fails to describe thoroughly mixing a CHP feedstream with either a recycle acetone stream or a CHP decomposition product recycle stream. (Paper No. 39, p. 22). Zakoshansky states that Hertzog's acetone recycle stream and CHP decomposition recycle stream are fed directly to the reactor. (*Id.*). Zakoshansky contrasts this description with that of Zakoshansky where the CHP feedstream and recycle streams may be mixed prior to entering a CHP decomposition reactor.

As discussed above, we provide Hertzog's claims with their broadest reasonable construction. Hertzog's claims do not identify where thorough mixing of the CHP feedstream and acetone occurs. Further, Hertzog's claims do not identify whether the term CHP feedstream is limited to the materials flowing through the CHP feedstream conduit or includes the CHP feed materials as they enter the CHP decomposition reactor. As noted by Zakoshansky, Hertzog's specification identifies the CHP feedstream and acetone recycle streams being fed directly into the reactor, along with other components. Giving Hertzog's claims their broadest reasonable construction in light of Hertzog's specification, we construe Hertzog's thorough mixing of the CHP feedstream with acetone as encompassing the mixing of the CHP "feedstream" with acetone after these components have entered the CHP decomposition reactor. We conclude that Zakoshansky fails to meet its burden of proof with respect to Hertzog's alleged lack of written description for thoroughly mixing the claimed streams.

v. DCP Decomposition at Greater than 90° C

Zakoshansky states that Hertzog claim 26 requires a DCP decomposition process where the temperature is greater than 90° C. and that Hertzog claim 31 requires heating to a temperature ranging from 90° to 150° C. (Paper No. 39, p. 23). Zakoshansky contrasts this claim limitation with Hertzog's specification, which describes heating the feedstream to the DCP decomposition reactor to a temperature of 120 to 150° C. (*Id.*). Additionally, Zakoshansky's expert, Mr. Fulmer, testifies that Hertzog's heater 8, which heats the CHP decomposition products to a minimum temperature of 120° C. prior to entering the DCP decomposition reactor, does not demonstrate that Hertzog carries out the DCP decomposition at a temperature of greater than 90° C. (ZX 2001, ¶¶ 189 and 190).

Hertzog responds to Zakoshansky's allegations by arguing that the CHP decomposition reaction is conducted at a temperature of between 50 and 90° C. (Paper No. 61, ¶ 111). Hertzog states that the effluent is then heated in a plug flow reactor to a maximum temperature of from about 120° C. to 150° C. Hertzog states that the heating occurs in about 30 seconds and that the effluent is then held at the higher temperature for about an additional thirty seconds and thus "only the majority of the decomposition was in the higher temperature (i.e., 'about 120° C' or higher)." (*Id.*). Hertzog and its expert, Mr. Gutzait, conclude that one skilled in the art would recognize that Hertzog decomposes the DCP in a temperature range of from 90° C. to 150° C. (*Id.* at ¶ 112 and HX 1030, ¶ 67).

Under the heading "Summary of the Invention," Hertzog's specification states:

(b) reacting the reaction mixture from step (a) [CHP decomposition reaction] at a temperature between 120 and 150° C under plug-flow conditions for a time sufficient to decompose substantially all residual CHP and at least 90% of DCP formed in step (a).

(HX 1027, p. 5, lines 3-7). We credit the testimony of Zakoshansky's expert, Mr. Fulmer, that one skilled in the art would understand that Hertzog's DCP decomposition process step employs a temperature of from 120 and 150° C. to decompose at least 90% of the DCP formed in Hertzog's CHP decomposition step (a). We do not credit Mr. Guitzait's testimony that one skilled in the art reading Hertzog's disclosure would understand Hertzog to possess a DCP decomposition reaction conducted at 90° C and higher (claim 26) or in a range of from about 90 and 150° C. (claim 31), which encompass decomposing all of the DCP at 90° C. We conclude that Zakoshansky has met its burden of proof and has demonstrated that Hertzog lacks written description for Hertzog claims 26 and 31.

Zakoshansky has presented sufficient and credible evidence to demonstrate that Hertzog claims 26, 31 and 32 lack sufficient written descriptive support under 35 U.S.C. §112, first paragraph. Zakoshansky Preliminary Motion 2 (Paper No. 39) is *granted-in-part* with Hertzog claims 26, 31 and 32 being found unpatentable and denied with respect to Hertzog claims 8-13, 15-25, 33-35, 37-38 and 40-42.

C. Zakoshansky Preliminary Motion 4: Request that Certain Hertzog Claims Be Held Unpatentable for Lack of Enablement, 35 U.S.C. 112, 1st para

Zakoshansky Preliminary Motion 4 (Paper No. 41) alleges that Hertzog claims 7-26, 29-35 and 43 are unpatentable to Hertzog on the ground that these claims lack an enabling disclosure. Specifically, Zakoshansky alleges that the claims are unpatentable as follows:

Hertzog Claims	Disputed Hertzog Claim Terminology
7-25	“whereby . . . the reaction is . . . more controllable”
26	“whereby selectivity for alpha methyl styrene is enhanced”
29-31	“whereby the dicumyl peroxide decomposition is better controlled”
32	“the reactors are thereby controlled”
33-35	“whereby . . . safety of the process improved”
43	“the efficient generation of recycle acetone”

(Paper No. 39, p. 1). Hertzog opposes. (Paper No. 63).

To comply with the enablement requirements of 35 U.S.C. §112, first paragraph, a specification must adequately teach how to make and how to use a claimed invention throughout its scope, without undue experimentation. *Plant Genetic Systems N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1339, 65 USPQ2d 1452, 1455 (Fed. Cir. 2003); *Enzo Biochem Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1371, 52 USPQ2d 1129, 1135 (Fed. Cir. 1999); *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993). The scope of enablement is that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation. *National Recovery Technologies, Inc. v. Magnetic Separation Systems, Inc.*, 166 F.3d 1190, 1196, 49 USPQ2d 1671, 1676 (Fed. Cir.

1999).

We have already construed each of the disputed Hertzog claim limitations. Many of the disputed terms are described in the prior art and those that are not described in the prior art merely state the result of the limitations in the claims and add nothing to the patentability or substance of the claims. Our interpretation of the prior art as it is applied to the disputed terminology is summarized below:

Disputed Hertzog Claim Terminology	Hertzog Claim Construction	Description of the Prior Art
“whereby . . . the reaction is . . . more controllable”	Encompasses lowering CHP level to about 0.2 to about 3 wt% in Hertzog step (a).	Sifniades prefers lowering CHP level to 0.8 to about 2 wt%. ZX 2006, col. 3, lines 63-68.
“whereby selectivity for alpha methyl styrene is enhanced”	Encompasses CHP decomposition process employing excess acetone	Messina directs one skilled in the art to employ excess acetone. ZX 2007, p. 12.
“whereby the dicumyl peroxide decomposition is better controlled”	This whereby clause merely states the result of limitations in the claims and does not add to patentability or substance of the claims.	
“the reactors are thereby controlled”	Encompasses lowering CHP level to about 0.2 to about 3 wt% in Hertzog step (a).	Sifniades prefers lowering CHP level to 0.8 to about 2 wt%. ZX 2006, col. 3, lines 63-68.
“whereby . . . safety of the process improved”	Encompasses lowering CHP level to about 0.2 to about 3 wt% in Hertzog step (a).	Sifniades prefers lowering CHP level to 0.8 to about 2 wt%. ZX 2006, col. 3, lines 63-68.
“the efficient generation of recycle acetone”	This preamble language does not add additional structure or steps to body of the claim and fails to give claim life, meaning and vitality to claim.	

A patent application need not teach, and preferably omits, what is well known in the art. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991). Based upon our construction of the disputed terms as they appear in Hertzog’s claims, we conclude that Zakoshansky fails to meet its burden of proving that one skilled in the art reading the prior art Sifniades and Messina references could not make and/or use Hertzog’s claimed processes and

compositions. Zakoshansky Preliminary Motion 4 is *denied*.

D. Hertzog Preliminary Motions 1 and 2: Request that Zakoshansky's Claims Be Held Unpatentable Under 35 U.S.C. §§102(d) and 103

Hertzog Preliminary Motion 1 requests that all of Zakoshansky's claims designated as corresponding to Count 1 be held unpatentable as anticipated and/or obvious over Zakoshansky's Soviet Union Author Certificates alone or in combination with Sifniades. (Paper No. 30).

Hertzog Preliminary Motion 2 requests that all of Zakoshansky's claims corresponding to Counts 2 and 3 likewise be held unpatentable over Zakoshansky's Author Certificates alone or in combination with Sifniades. (Paper No. 31).¹⁵ Zakoshansky opposes. (Paper Nos. 52 and 53).

We do not analyze Zakoshansky claims 21 and 39 in light of the prior art cited in Hertzog Preliminary Motions 1 and 2 as Zakoshansky did not attempt to distinguish these claims over the art cited in Zakoshansky's own prior art (Sifniades, Messina) patentability preliminary motions.

1. Anticipation

Hertzog argues and Zakoshansky does not dispute that Zakoshansky applied for and received a number of author certificates from the Soviet Union more than twelve months prior to filing Zakoshansky's U.S. patent application on September 14, 1992. Specifically, Zakoshansky applied for and received the following Soviet Author's Certificates:

¹⁵Hertzog Preliminary Motions 1 and 2 mention judgment against Zakoshansky on Counts 1, 2 and 3 on prior art. As apparent from the motions, Hertzog's specific request is that the Board hold Zakoshansky's corresponding claims unpatentable based upon prior art.

Certificate No.	Priority Date	Registration Date
1116688 ('688) (HX 1009)	May 20, 1983	June 1, 1984
1361937 ('937) (HX 1008)	November 14, 1985	August 22, 1987
1391030 ('030) (HX 1007)	July 10, 1986	December 22, 1987
1563181 ('181) (HX 1006)	July 26, 1988	January 8, 1990
1699135 ('135) (HX 1005)	December 1, 1988	August 15, 1991

(Paper No. 30, ¶ 13, admitted by Zakoshansky, Paper No. 52). Hertzog states that Zakoshansky's Soviet Union certificates constitute prior art to Zakoshansky under 35 U.S.C. §102(d).¹⁶

Dr. Zakoshansky submitted a declaration during prosecution of Zakoshansky's involved '092 reissue application. (HX 1011). In his declaration, Dr. Zakoshansky testified that in 1991, with the events leading to the dissolution of the U.S.S.R., authors were permitted to convert certain of their author's certificates to patents. (*Id.* at ¶ 8). Dr. Zakoshansky testified that he together with other named authors converted the '135, '181, '030 and '937 author certificates to patents on July 1, 1991, and that the patents were made available to the public on February 15, 1992. (HX 1011, ¶ 8). An invention is "patented" in a foreign country under section 102(d) when the patentee's rights under the patent become fixed as opposed to when it becomes publically available. *In re Kathawala*, 9 F.3d 942, 946, 28 USPQ2d 1785, 1787-88 (Fed. Cir.

¹⁶Section 102(d) provides that:

A person shall be entitled to a patent unless . . . the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States.

1993). Accordingly, Zakoshansky's patents were available under 35 U.S.C. §102(d) at least as of July 1, 1991, which is prior to Zakoshansky's effective U.S. filing date.

Zakoshansky's involved '092 application is a reissue of U.S. Patent No. 5,254,751 ("751"). In requesting the reissuance of its patent, Zakoshansky submitted several declarations, including a declaration by Martin B. Barancik (HX 1013), the attorney responsible for the preparation and filing of the application which issued as Zakoshansky '751. Mr. Barancik's declaration testimony states that when he filed Zakoshansky's U.S. application he was not aware that 35 U.S.C. §102(d) applies to disclosed subject matter that was not claimed. (HX 1013, ¶ 8). Mr. Barancik's declaration states that he now understands that 35 U.S.C. §102(d) applies "not only to inventions claimed, but also to inventions that were disclosed and could have been claimed in a prior foreign patent or inventor's certificates." (HX 1013, ¶ 14). Mr. Barancik's declaration states that certain claims of the '751 patent are unpatentable over Zakoshansky's Russian Patents under 35 U.S.C. §102(d). (*Id.*). Dr. Zakoshansky's reissue declaration also states that certain claims of the '751 patent are unpatentable over Zakoshansky's Russian patents.

Hertzog alleges and Zakoshansky does not dispute that the Soviet Author Certificates, including those issued as patents are prior art against Zakoshansky under 35 U.S.C. §102(d). (*See, e.g.,* Zakoshansky Opposition 1, p. 24, "The Soviet Author's Certificates are references against Zakoshansky's reissue application only under 35 U.S.C. §102(d)"). Based upon the evidence presented, we hold that Zakoshansky's author certificates '135, '181, '030 and '937, which were filed and subsequently patented more than twelve months prior to filing in the U.S., are available as prior art to Zakoshansky under 35 U.S.C. §102(d).

Hertzog alleges that Zakoshansky's '688 author's certificate constitutes prior art under 35 U.S.C. §102(d) as against Zakoshansky. (See, *e.g.*, Paper No. 30, ¶¶ 12-17). Hertzog cites to and relies upon the teachings of the '688 certificate, as well as the '135, '181, '030 and '937 certificates, as prior art against Zakoshansky. (See, *e.g.*, Paper No. 30, ¶¶ 18, 20-21 and Appendix A, claim 4). At times, Hertzog refers to Zakoshansky's "author's certificates," including the '688 author's certificate, as "inventor's certificates." (See, *e.g.*, Paper No. 30, ¶ 12 and p. 23).

The '688 author's certificate was granted by the "USSR State Committee of the inventions and discoveries" and states that the "priority of the invention" is May 20, 1983. (HX 1009, cover sheet). The '688 cover sheet further states that the document was recorded in the state register of the USSR inventions on June 1, 1984. (*Id.*)

In opposing Hertzog Preliminary Motions 1 and 2, Zakoshansky does not argue that its '688 "author's certificate" is not an inventor's certificate for purposes of 35 U.S.C. §102(d). For example, Hertzog Preliminary Motion 1 states as a finding of fact that "Zakoshansky obtained several inventor's certificates (the 'Soviet Author's Certificates)." (Paper No. 30, ¶ 12). While Zakoshansky denied this alleged fact on other grounds, Zakoshansky did not particularly deny that the "author's certificates" may be considered "inventor's certificates." (Paper No. 52, ¶ 12 and p. 24, "The Soviet Author's Certificates are references against Zakoshansky's reissue application only under 35 U.S.C. §102(d)").

In *Ethicon Inc. v. United States Surgical Corp.*¹⁷, a federal district court explained in a finding of fact that:

In the Soviet system, an inventor has the option to apply for either an "inventor's certificate" or a patent. If he chooses the former, he transfers all rights in the invention to the State and will receive only the "benefit" of public recognition. A patent, on the other hand, permits the inventor to retain the right to license his invention to the State, thereby receiving potential royalties. Both would give an inventor international priority according to applicable international conventions. If the criteria of patentability are established to the satisfaction of the State Committee, an inventor's certificate or patent will be issued.

Id. at 1725.

The '688 author's certificate appears on its face to be a certificate that, at a minimum, confers international priority of invention rights. Hertzog alleges and Zakoshansky does not specifically deny that the author's certificate may be considered an inventor's certificate and Zakoshansky, as the recipient of the '688 author's certificate, is in the best position to refute Hertzog's allegation. Further, we note that Mr. Barancik's reissue declaration specifically states his belief that Zakoshansky's Russian Author Certificates "needed to be considered under 35 U.S.C. § 102(d), which applied to inventions that were 'the subject of an inventor's certificate.'" (HX 1013, ¶ 7).

Ultimately, as discussed below with respect to the teachings of the '688 certificate, the issue of whether or not the '688 certificate is 102(d) art appears moot as we have determined that Hertzog fails to meet its burden of proving that the '688 certificate anticipates Zakoshansky's involved claims. Further, as to obviousness, we hold that the '688 certificate is at best

¹⁷19 USPQ2d 1721 (D.C Conn., 1991).

cumulative to the other art of record and at worst irrelevant. Accordingly, we do not decide the question of whether or not the '688 certificate is available as section 102(d) art as against Zakoshansky.

Anticipation requires that one skilled in the art reasonably understand that all claim limitations were disclosed in a single prior art reference. *Dayco Prods., supra*. Accordingly, we analyze Zakoshansky's claims against each of the certificates to determine whether or not all of the limitations of a claim are fully disclosed by a particular certificate.

Hertzog Preliminary Motions 1 and 2 allege that Zakoshansky's involved claims are unpatentable under 35 U.S.C. §§102(d) and 103. When anticipation is the basis for a preliminary motion alleging that an opponent's claims are unpatentable, the preliminary motion shall contain an appendix reproducing each claim alleged to be anticipated and identify where each element in the claims are found in the prior art being applied. (Standing Order, Paper No. 2, §26(d)). Similarly, when obviousness is the basis for a preliminary motion, the moving party shall include a claim chart that identifies where each element in the disputed claims is found in the prior art and any difference between the prior art and the claims "shall be explicitly identified." (*Id.* at §26(e)).

We limit our review of Hertzog Preliminary Motions 1 and 2 to the specific allegations raised in the claim charts attached to these preliminary motions. *Id.* at §§26(e) and (d), and, *c.f.*, *Genentech v. Amgen*, 289 F.3d 761, 774, 62 USPQ2d 1640, 1649 (Fed. Cir. 2002) (Genentech precluded from proceeding on a theory of infringement under the doctrine of equivalents because Genentech did not expressly include that theory in a claim chart as required by local rules). We

make a limited exception to Standing Order §§26(e) and (d) for Hertzog Preliminary Motion 2. Hertzog Preliminary Motion 2 explicitly states in both its fact and argument sections that Zakoshansky claims 22-26 are anticipated by Zakoshansky's '030 certificate. (Paper No. 31, ¶¶ 48-56 and p. 14). Further, Hertzog Preliminary Motion 2 explicitly provides both facts and argument that Zakoshansky claim 38 is anticipated by the disclosure of the '181 certificate. (Paper No. 31, ¶¶ 57-64 and p. 14). While the claim charts attached to Hertzog Preliminary Motion 2 do not specifically identify all the limitations of Zakoshansky claims 22-26 as described by the '030 certificate and do not identify all the limitations of Zakoshansky claim 38 as described by the '181 certificate, we find that Hertzog Preliminary Motion 2 provides sufficient notice to Zakoshansky and the Board of Hertzog's specific allegations regarding anticipation and obviousness for these certificates and claims. We exercise our discretion and consider Hertzog's allegations regarding Zakoshansky claims 22-26 with respect to the '030 certificate and regarding Zakoshansky claim 38 with respect to the '181 certificate. Additionally, we make a limited exception to Hertzog Preliminary Motion 1 with respect to the obviousness of Zakoshansky claims 34 to 36, which require the addition of water to a CHP decomposition process. Specifically, while not cited in Hertzog's claim charts, we analyze these claims in light of Zakoshansky's own allegations that Sifniades teaches the desirability of adding water to a CHP decomposition process.

a. The '688 Certificate

The '688 certificate describes a method of producing phenol, acetone and AMS by acid cleavage of CHP. ('688, HX 1009A, p. 1). The '688 certificate states that a purpose of the invention is to increase yield as well as to decrease the production of tars. (*Id.* at 2). To accomplish its objectives, the '688 certificate teaches one skilled in the art to conduct an acid CHP cleavage at a temperature of 75 to 85° C., which is said to increase process selectivity. (*Id.*).

As noted by Hertzog, the '688 certificate teaches the use of various acidic catalysts including sulfuric acid and mixtures of sulfuric acid and ammonium bisulfate. (*Id.*). The '688 certificate identifies a technical CHP feedstream as containing 91.8% CHP, 6% dimethyl phenyl alcohol, 1% acetophenone and 1.2% cumene. (*Id.*, Examples 1, 2 and 3).

As noted above, the Standing Order provides that unpatentability motions based upon prior art include an appendix identifying each claim alleged to be unpatentable and:

Following each element or step recited in the claim, and within braces { }, there shall be inserted in bold a specific citation to the column and line and/or drawing figure and numeral and/or other material where a prior art reference describes each element or step recited in the claim. Braces { } are required instead of brackets [] because brackets are used in claims in reissue applications.

(Standing Order, Paper No. 2, §§26(d) and (e)).

Hertzog's claim charts do not identify how the '688 certificate anticipates Zakoshansky's claims. In particular, Hertzog's claim charts do not direct our attention to where the '688 certificate describes a non-isothermal CHP decomposition, excess acetone or a multiplicity of reactors. (See, Paper No. 30, Claim Chart - Appendix A, *e.g.*, claims 1 and 4). This failure is consistent with the declaration testimony of Hertzog's expert, Dr. Levy, who states that:

“[e]xcept for the ‘688 Author’s Certificate, each of the Soviet Author’s Certificates discloses two-stage processes using multiple sequential reactors with controlled temperature ranges.” (HX 1024, ¶ 48).

Additionally, Hertzog recognizes that Zakoshansky’s claimed 10-18% cumene is not explicitly taught by the Certificates but argues that this is a “de minimus difference from the Certificates use of ‘technical CHP’ containing approximately 1.2% residual cumene.” (Paper No. 31, Appendix A, see, e.g, claim 1). According to Hertzog, technical CHP is well known to contain from 1 to 20% unreacted cumene. Hertzog relies upon the declaration testimony of Dr. Levy to support this allegation. Dr. Levy’s testimony however, merely states that “typically” technical CHP contains about 1-20% unreacted cumene but Dr. Levy does not identify evidence to support this statement or provide a credible basis for concluding that the technical CHP and examples employing technical CHP having the 1.2% cumene found in the Certificates describes the claimed 10-18% cumene. We do not credit Dr. Levy’s unsupported testimony that technical CHP contains 10-18% cumene. Hertzog has failed to meet its burden of establishing that Zakoshansky’s certificates teach and/or describe the use of 10-18% cumene.

As Hertzog has failed to provide the requisite chart identifying how the ‘688 certificate teaches all the material limitations recited in a particular Zakoshansky claim or set of claims, and as its expert, Dr. Levy, appears to recognize that the ‘688 certificate, taken by itself, does not describe Zakoshansky’s claimed invention, we deny those portions of Hertzog Preliminary Motions 1 and 2 that allege that Zakoshansky’s claims are anticipated by the ‘688 certificate.

b. The '937 Certificate

The '937 certificate describes a process for the production of phenol, acetone and AMS from CHP. (HX 1008A, p. 1). The goal of the process is to decrease the consumption of cumene and increase productivity at the CHP cleavage stage. (*Id.*). The '937 certificate describes carrying out the CHP cleavage in the presence of sulfuric acid and ammonia at 35 to 60° C. and then subjecting the products to a temperature of 70 to 100° C in a plug-flow reactor. (*Id.*). In order to cool the CHP cleavage reaction mass, the mass is taken from the initial reactor and cooled in two sequential reactor-coolers. (*Id.* at examples). According to the '937 certificate, technical CHP is fed continuously. (*Id.*). The CHP feed is mixed with a recirculation mass at the first CHP decomposer reactor inlet. (*Id.* at examples).

Hertzog's expert, Dr. Levy, testifies that one skilled in the art would understand that the '937 process is conducted in a continuous manner. (*Id.* at examples 1-2 and HX 1024, ¶ 45). Dr. Levy further testifies that one skilled in the art would understand that CHP was extremely reactive when mixed with an acidified reaction mass and that it would be "an inherent requirement that the two streams be thoroughly mixed together with static mixers or liquid eductors." (HX 1024, ¶ 29). Dr. Levy also states that the acid catalyst is partially neutralized in the first stage by the addition of 1% aqueous ammonia. (*Id.* at ¶ 28).

Dr. Vladimir Zakoshansky filed a Reissue Declaration in the involved '092 application. In his Reissue Declaration, Dr. Zakoshansky provides several statements concerning the teachings of his '937 Author's Certificate. For example, Dr. Zakoshansky states that:

Example 2 of my Author Certificate 1,361,937, for example, discloses a reaction providing enhanced selectivity wherein dicumyl peroxide is decomposed in the

presence of an acidic catalyst at a temperature of 100° C, as called for by issued Claim 11, and wherein ammonia is added to provide an amine reaction product and ammonia as called for by issued Claims 12 and 14, respectively, wherein sulfuric acid is the acidic catalyst as called for by issued Claim 13, and wherein the reaction product is ammonium hydrogen sulfate as called for by issued Claim 15. Therefore, I believe that Example 2 of my Author Certificate 1,361,937 discloses a process described by issued Claims 11 and 12-15. (HX 1011, ¶ 20).

Example 2 of my Author Certificate 1,361,937, for example, discloses a reaction providing better control wherein dicumyl peroxide is decomposed in the presence of a weakly acid material formed as the reaction product of an acidic CHP catalyst and ammonia, as called for by issued Claims 16, 18 and 19, wherein sulfuric acid is the acidic material as called for by issued Claim 17, and wherein the reaction is carried out at a temperature of 100° C as called for by issued Claim 20. Therefore, I believe that Example 2 of my Author Certificate 1,361,937 discloses a process described by issued Claims 16 and 17-20. (HX 1011, ¶ 23).

Example 2 of my Author Certificate 1,361,937, for example, discloses a reaction providing better control wherein cumene hydroperoxide is decomposed at a specific acidic catalyst concentration and temperature whereby a composition comprising phenol, acetone and dicumyl peroxide is formed, and the reaction mass containing the dicumyl peroxide is transferred to a plug flow reactor wherein decomposition of the dicumyl peroxide to phenol, acetone and alphas-methylstyrene occurs in a weaker acidic catalyst medium and a higher temperature than the CHP decomposition catalyst concentration and temperature. Example 2 also discloses the addition of ammonia, as called for by issued Claim 29. Therefore, I believe that Example 2 of my Author Certificate 1,361,937 discloses a process described by issued Claims 27 and 29. (HX 1011, ¶ 32).

Hertzog fails to explain how the '937 certificate, as interpreted by Hertzog's expert and by Dr. Zakoshansky, teaches all the limitations recited in Zakoshansky's involved reissue claims. For example, Hertzog's claim charts do not identify where the '937 certificate describes the use of recycle/excess acetone, 10-18% cumene, DCP decomposition in a weaker acidic catalyst medium (claim 28), or passing a portion of the outlet stream of the last sequential reactor into a reactor of plug flow design that is of smaller size than the CHP reactors (claim 30).

As the moving party, Hertzog bears the burden of proving by a preponderance of the evidence that it is entitled to the relief requested. Based upon the record presented, Hertzog fails to identify in its claim charts where the '937 certificate teaches all the limitations contained within a particular Zakoshansky claim or set of claims. We deny the portion of Hertzog Preliminary Motions 1 and 2 that alleges that Zakoshansky's claims are anticipated by the '937 certificate.

c. The '030 Certificate

The '030 certificate relates to a process for producing phenol, acetone and AMS. The process involves decomposing CHP with an acid catalyst in a circuit at a temperature of from 40 to 70° C. where ammonia or water is added. (HX 1007A, p. 2). The products from the decomposition are sent to a plug-flow reactor and held at a temperature of from 80 to 100° C. (*Id.* at 3). Acetone is added to the plug-flow reactor in an amount of from 10 to 40 wt% of the decomposition mass. (*Id.*). According to the '030 certificate, the process described therein stabilizes the yield of the desired products. (*Id.*).

Hertzog argues that the '030 certificate provides a description of additional subject matter relating to the "same continuous, non-isothermal, two-stage process described in the '937 Certificate." (Paper No. 31, ¶ 33). Hertzog states that the additional subject matter relates to partially neutralizing the sulfuric acid catalyst with ammonia and additional acetone prior to entering the second-stage dehydrator. (*Id.* at ¶ 34).

Hertzog fails to identify in its claim charts where the '030 certificate teaches all the limitations contained within a particular Zakoshansky claim or set of claims. As discussed above, however, we exercise our discretion and review Hertzog's facts and arguments contained in Hertzog Preliminary Motion 2 with respect to the '030 certificate and Zakoshansky claim 38.

Zakoshansky claim 38 is a product by process claim that defines a CHP decomposition product. A product by process claim is anticipated by any prior art reference that describes a product that is the same as that made by the recited process. *See, In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). According to Hertzog, the "same" composition as that of Zakoshansky claim 38 results from the "same" two-stage decomposition process described by Zakoshansky's '181 certificate. (Paper No. 31, p. 14).

The CHP decomposition mass of Zakoshansky claim 38 is produced by a continuous non-isothermal reaction of CHP in the presence of a sulfuric acid catalyst. The reaction employs an acetone to phenol ratio of about 1.1:1 to 1.5:1 and cumene in an amount of about 10 to 18 wt. %. In contrast, the reaction described in the examples of Zakoshansky's '181 certificate contains 1.2% cumene. Hertzog Preliminary Motion 2 relies upon the testimony of Dr. Levy to establish that the product described in Zakoshansky '181 is the same as that of Zakoshansky claim 38. (Paper No. 31, p. 14). Dr. Levy testifies that:

The only variation between the claimed composition [Zakoshansky claim 38] and the one disclosed in the ['181] Certificate stems from the use of technical CHP with a higher percentage of cumene in the '092 Application. However, this is at best a minor variation between the process by product claimed in the '092 Application and the one disclosed in the '181 Certificate.

(HX 1024, ¶ 67). As apparent from Dr. Levy's testimony, the '181 certificate describes a composition that differs from that of Zakoshansky claim 38. We conclude that the '181 certificate does not describe the "same" composition as that required by Zakoshansky claim 38.

We deny the portion of Hertzog Preliminary Motions 1 and 2 that alleges that Zakoshansky's claims are anticipated by the '030 certificate.

d. The '181 Certificate

As with the other Zakoshansky certificates, the '181 certificate describes a process for the production of phenol, acetone and AMS. The process generally comprises a CHP decomposition stage and a DCP decomposition stage. (HX 1006A, pp. 2-3). The CHP decomposition is conducted in three sequential reactors with 50-60% decomposition in the first reactor, 30-37% in the second and 20-3% in the third. (*Id.*). The temperature ranges from 40 to 70° C. in the CHP decomposition circuit and the decomposition is conducted in the presence of sulfuric acid. (*Id.*). Excess acetone is supplied to the first reactor of the circuit. (*Id.* at 3). The products from the CHP decomposition reaction are sent to a plug-flow reactor and held at a temperature of from 85 to 105° C and a pressure of 0.3-5 gage atm. (*Id.*). The '181 certificate states that the process is simplified due to the use of the reaction product acetone instead of a NH₃ solution and that there is an improvement in process safety through the elimination of the overneutralization of sulfuric acid with the NH₃. (*Id.*). We find that the '181 certificate exemplifies continuous processes as Zakoshansky's examples identify the quantity of materials in the processes in terms of weight per hour. (*Id.* at Examples).

Zakoshansky's Reissue Declaration provides numerous statements concerning the teachings of his '181 Certificate. For example, Dr. Zakoshansky's declaration states:

[I]ssued Claim 1 reads on Example 2 of my Author Certificate 1,563,181 which discloses a process for the acid catalyzed decomposition of CHP to phenol and acetone in a *nonisothermal manner* in the presence of an amount of *excess acetone* according to the algorithm ' $y = 36.61 - 0.832x$,' where x is the feed of technical CHP to the first decomposition reactor in tons/hour and y is the weight percent additional acetone based on the technical CHP feed. Applying the algorithm, *Example 2 of my Author Certificate discloses a mole ratio of acetone to phenol of 1.42:1*, within the 1.1:1 to 1.5:1 range of issued Claim 1. Also, I believe that Example 2 of my Author Certificate discloses a process wherein the rate of decomposition of CHP is reduced and the reaction is more controllable and more selective. (HX 1011, ¶ 14, emphasis added).

Issued Claims 7-9 omitted a limitation to the preferred embodiment of my method which requires thorough mixing of the excess acetone with the CHP feed-stream *before being introduced* into the first CHP decomposition reactor. Without this limitation, issued Claims 7-9 read on Example 2 of my Author Certificate 1,563,181, which discloses that sulfuric acid is used as the catalyst as called for by Claim 7, that the sulfuric acid is added in an amount which provides about 260 ppm of sulfuric acid based on the weight of the reaction mass as called for by Claim 8, and that the temperature of the decomposition was maintained within the range of 40-70° C, a range that overlaps with the 45-75° C range of Claim 9. (*Id.* at ¶ 17, emphasis added).

This error [in issued claims 7-9] is corrected by amending issued Claims 7-9 to depend from issued Claim 2 rather than from issued Claim 1. Issued Claim 2, unlike issued Claim 1, is limited to the method "wherein the acetone is thoroughly mixed with the cumene hydroperoxide feed-stream." (*Id.* at ¶ 18).

The '181 certificate appears to teach each and every limitation present in Zakoshansky claims 2, 4, and 7-9. Specifically, Zakoshansky independent claim 2 requires a non-isothermal CHP decomposition process that employs sulfuric acid as the acidic catalyst and is carried out in the presence of excess acetone that is thoroughly mixed with the CHP feed-stream and where the molar ratio of acetone to phenol in the CHP decomposition reactor is from about 1.1:1 to 1.5:1.

As acknowledged by Dr. Zakoshansky, Example 2 of his '181 certificate describes a non-isothermal CHP decomposition process employing sulfuric acid catalyst and a ratio of acetone to phenol of 1.42:1. (HX 1011, ¶ 26). Both technical grade CHP and acetone are supplied to the first CHP decomposition reactor and Zakoshansky claim 2 does not require "premixing."

Zakoshansky independent claim 4 is similar to claim 2 but requires a multiplicity of separate sequential reactors each with a controlled temperature range and does not recite thoroughly mixing the excess acetone with the CHP feedstream. The '181 certificate teaches using three sequential CHP decomposition reactors maintained in a temperature range of from 40 to 70° C.

Dr. Zakoshansky admitted in his Reissue Declaration that issued claims 7-9 were unpatentable over example 2 of the '181 certificate. As stated by Dr. Zakoshansky, issued claims 7-9 were unpatentable as they failed to recite the limitation of mixing excess acetone with the CHP feed-stream before introduction into the CHP decomposition reactor. (*Id.* at ¶ 17). We find this admission credible. Zakoshansky claim 7 limits claim 4 to a sulphuric acid catalyst, which is taught by the '181 certificate. (*Id.* at ¶ 17). Zakoshansky claim 8 limits claim 2 to a catalyst concentration of 150 to 600 ppm, which encompasses the 260 ppm of sulfuric acid catalyst that Dr. Zakoshansky identified in Example 2 of his '181 certificate. (*Id.*). Zakoshansky claim 9 limits claim 2 to a CHP decomposition temperature range of from "about" 45 to 75° C., and the '181 certificate describes a 40 to 70° C. temperature range.

Dr. Zakoshansky states in his Reissue Declaration that issued claims 7-9 were amended to depend from claim 2, and that issued claim 2 was amended to recite thorough mixing of the

excess acetone and the CHP feed-stream. Dr. Zakoshansky states that this amendment corrects the error in claims 7-9.¹⁸ We do not credit this statement. As discussed above, Zakoshansky's involved claim 2 merely states that the acetone is thoroughly mixed with the CHP feedstream and does not mention that the mixing is conducted prior to entering the CHP decomposition reactor. Providing involved claim 2 with its broadest reasonable interpretation, we conclude that claim 2 does not require mixing the acetone with the feed-stream *before* entering the CHP decomposition reactor. As claims 7-9, and claim 2, do not require mixing prior to entering the CHP decomposition reactor, the claims are unpatentable over the '181 certificate, for the reasons provided by Dr. Zakoshansky in his Reissue Declaration as well as those provided by Hertzog.

Zakoshansky argues that the '181 certificate does not teach a non-isothermal process as that term is construed in light of Zakoshansky's involved specification. (See, Paper No. 52, Appendix A, claim 2; Second Declaration of Mr. Fulmer, ZX 2023, ¶ 75). Yet, Dr. Zakoshansky has already identified the '181 certificate as teaching the non-isothermal process recited in his issued claims. (HX 1011, ¶ 14). As Dr. Zakoshansky is the author of both the certificate and the involved specification, we credit Dr. Zakoshansky's Reissue Declaration statement that example 2 of the '181 certificate is a non-isothermal process that reads on Zakoshansky's non-isothermal process of issued claim 1.

Zakoshansky also argues that the '181 certificate teaches the addition of acetone to both the CHP decomposition reactor and to the DCP decomposition reactor whereas Zakoshansky's

¹⁸Claim 7 now depends from claim 4. (Zakoshansky Appendix of Claims Now Pending, Paper No. 105).

involved claims add acetone only to the CHP decomposition reactor. (See, Paper No. 52, Appendix A, claim 2). Zakoshansky's involved claims are written with the comprising transition terminology. The transition "comprising" in a method claim opens the claim to additional process steps. *Medichem S.A. v. Rolabo S.L.*, 353 F.3d 928, 933, 69 USPQ2d 1283, 1287 (Fed. Cir. 2003). Accordingly, we construe Zakoshansky's claims as open to the additional step of adding acetone to the DCP decomposition reactor.

Additionally, Zakoshansky argues that its claims 2, 4 and 7-9 recite a molar ratio of acetone to phenol of from 1.1:1 to 1.5:1 and that the '181 certificate merely exemplifies 1.42:1 rather than the entire range. Just as a species may anticipate an encompassing genus, a single composition may anticipate a genus encompassing that composition. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782, 227 USPQ 773, 779 (Fed. Cir. 1985).

Based upon the record presented, we conclude that Zakoshansky claims 2, 4, and 7-9 are anticipated by Zakoshansky's '181 certificate under 35 U.S.C. §102(d). We grant that portion of Zakoshansky Preliminary Motion 1 that requests a finding that claims 2, 4, and 7-9 are unpatentable as anticipated by the '181 certificate.

Hertzog Preliminary Motion 2 alleges that all the limitations of Zakoshansky composition claims 22 through 26 may be found in Zakoshansky's '030 certificate. Zakoshansky claim 22 is generally directed to a composition comprising cumene, an acidic catalyst, DCP, water, phenol, acetone and a reaction product of an amine and an acidic catalyst. The acetone to phenol ratio ranges from 1.15:1 to 1.4:1. Zakoshansky claims 23 to 26 depend directly or indirectly upon claim 22 and further limit the acidic catalyst and the amine.

Hertzog relies upon the testimony of Dr. Levy to establish that example 3 of the '030 certificate describes the composition claimed in Zakoshansky claims 22-26. Dr. Levy testifies that:

Example 3 of the '030 Certificate discloses the use of a reaction mixture in a two-stage process, the composition comprising CHP, DMBA, cumene, sulfuric acid, ammonia, and acetone equivalents to 10% of the reaction mass when fed into the dehydrator, i.e., a molar ratio of 1.3:1 acetone to phenol.

(HX 1024, ¶ 53). As to the presence of DCP in '030 example 3, Dr. Levy states that "DCP is necessarily produced in the decomposer in significant quantities, and would be present in decomposer effluent." (*Id.* at ¶ 54). Dr. Levy concludes that, "given the chemistry underlying the two-stage process, all of the components required by Zakoshansky claims 22-26 "must be present in the dehydrator's reaction mixture." (*Id.* at ¶ 55).

Zakoshansky disputes Hertzog and Dr. Levy's allegation that DCP is necessarily present in example 3 of the '030 certificate. Zakoshansky notes that Dr. Levy cites "no evidence supporting that DCP is necessarily a product of every implementation of CHP decomposition process." (Paper No. 53, ¶ 54).

Hertzog responds to Zakoshansky's opposition by directing our attention to Dr. Zakoshansky's reissue declaration where Dr. Zakoshansky states that, unless amended to include a ratio of acetone to phenol in a ratio of from about 1.15:1 to 1.4:1, issued claims 22-26 are unpatentable over example 2 of the '181 certificate. Dr. Zakoshansky's reissue declaration does not explicitly state, however, that the DCP is inherently present in example 2 of the '181 certificate. Further, Hertzog fails to provide a sufficient explanation of why the alleged presence of DCP in example 2 of the '181 certificate necessarily implies that the decomposer effluent in

example 3 of the '030 certificate will inherently have DCP. We note that, while similar, the processes identified in example 2 of the '181 certificate and example 3 of the '030 certificate differ. For example, the decomposer circuit of the '181 certificate "is maintained in the interval of 40-70°C" whereas the decomposer circuit in the '030 certificate "is maintained at 40°C." (HX 1006a, Examples 1 & 2; HX 1007A, Examples 1 & 3).

Hertzog, as moving party, bears the burden of proving that it is entitled to the relief requested. Anticipation is established only if each and every element of a properly construed claim is found, either expressly or inherently described, in a prior art reference. *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1566, 37 USPQ2d 1618, 1624-1625 (Fed. Cir. 1996). Inherent anticipation is not established by "probabilities or possibilities." *Scaltech, Inc. v. Retec/Tetra, LLC.*, 178 F.3d 1378, 1384, 51 USPQ2d 1055, 1059 (Fed. Cir. 1999). We do not credit Dr. Levy's contention that DCP is necessarily present in the reactor mass leaving the CHP decomposer as Dr. Levy has failed to provide sufficient supporting evidence to support his conclusion that DCP is always present in the reactor mass. *Rohm & Hass Co. v. Brotech Corp.*, 127 F.3d 1089, 1092, 44 USPQ2d 1459, 1462 (Fed. Cir. 1997) (Nothing in the rules or in jurisprudence requires trier of fact to credit the unsupported or conclusory assertions). Based upon the record presented, we conclude that Hertzog has failed to establish that the '030 certificate anticipates Zakoshansky claims 22-26.

We have considered Hertzog Preliminary Motions 1 and 2 to the extent they present claim charts identifying how the '181 certificate teaches the material limitations found in Zakoshansky claims 1, 3, 5-6, 10-20, 27-31 and 33-38 and 40-41 but we do not find these

arguments to be supported by the record. For example, Hertzog's claim charts do not identify where the '181 certificate contains the limitations recited in Zakoshansky claims 6, 10, 28, 30, 31, and 33-36.

Hertzog alleges that one skilled in the art would understand that technical CHP was known in the art to encompass 1-20% cumene and thus the certificates "expressly suggested" Zakoshansky's claimed 10-18%. (See, Paper No. 30, Appendix A, claims 1, 27, 29 and 37-38). Hertzog fails to establish that a general teaching of technical CHP and an exemplification of 1.2% cumene "expressly suggests" 10-18% cumene as opposed to merely motivating one skilled in the art to select 10-18% cumene. Based upon the record presented, we conclude that Hertzog fails to meet its burden of proof with respect to the anticipation of Zakoshansky's 10-18% cumene.

Hertzog also argues that the '181 certificate teaches recycling the acetone product as claimed in Zakoshansky claims 11-20, and 40-41. (See, e.g., Paper No. 30, Appendix A, claim 11). Surprisingly, Hertzog's own expert, Dr. Levy makes the statement that the '181 certificate "discloses the addition of a recycle acetone stream feeding the circulation loop (but without disclosing the source of the acetone)." (HX 1024, ¶ 34). Having reviewed the '181 certificate, we credit Dr. Levy's testimony that the '181 certificate does not disclose the source of the additional acetone added to the CHP decomposition process. We do not credit Dr. Levy's conclusion that, although not identified, the '181 certificate discloses a recycle acetone stream.

As to Zakoshansky claim 3, Hertzog alleges that the '181 certificate teaches a species of the algorithm $G_{\text{acetone}} = G_{\text{chp}}(0.17)([\text{CHP}]) + 40/G_{\text{chp}}[\text{CHP}]$. (See Paper No. 30, Appendix A,

claim 3). Hertzog does not explain how the formulas disclosed in the '181 application are a "species" of the claimed algorithm. Accordingly, we hold that Hertzog has not met its burden of proof with respect to Zakoshansky claim 3.

Hertzog contends that the '181 certificate inherently teaches Zakoshansky claim 5's three reactors having temperatures ranging from 50° to 62° C. in the first reactor, about 62° to 57° C. in the second reactor, and about 57° to 50° C. in third reactor. (Paper No. 30, Appendix A, claim 5). According to Hertzog, these temperature ranges are inherently disclosed as the maximum temperature is said to be approximately 60° C. in the first reactor and as the two subsequent reactors are both cooler-heat exchangers. (*Id.*). Inherency requires inevitability and may not be established by probabilities or possibilities. *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981); *Dreyfus v. Sternau*, 357 F.2d 411, 415, 149 USPQ 63, 66 (CCPA 1966). Hertzog fails to explain why Zakoshansky's claimed temperature ranges are "inevitable" rather than mere possibilities.

Hertzog's claim charts identify Example 2 of the '181 certificate as teaching all the limitations of Zakoshansky claims 22 and 23, which require the presence of a reaction product of an amine and an acid catalyst. Example 2 of the '181 certificate does not employ an amine.

Hertzog fails to identify where the '181 certificate teaches all the limitations contained within Zakoshansky claims 1, 3, 5-6, 10-20, 22-31 and 33-38 and 40-41. We deny the portion of Hertzog Preliminary Motions 1 and 2 that alleges that Zakoshansky claims 1, 3, 5-6, 10-20, 22-31 and 33-38 and 40-41 are anticipated by the '181 certificate.

e. The '135 Certificate

The '135 certificate describes a method of employing automatic control for regulating a CHP decomposition process. (HX 1005A, p. 135.3). Specifically, the '135 certificate teaches a method of controlling the process through the use of on-line calorimetry to measure temperature changes in the reaction mass in the exit stream of the CHP decomposition reactor and uses this and other values to control the reaction by adjusting certain parameters (*e.g.*, cooling water flow rates) of the process. (*Id.*, and Levy Dec., HX 1024, ¶ 36).

The '135 CHP process involves adding a technical grade CHP reaction mass together with a CHP decomposition product recycle stream, a sulfuric acid catalyst, and ammonia or water. (HX 1005A, p. 135.4). The reaction mass enters the main CHP reactor at a temperature of approximately 60° C. (*Id.*). After leaving the main CHP reactor, the stream travels through a first and second cooling stage. (*Id.*). Most of the stream leaving the second cooling stage is recycled and about 5% of the stream is sent to an intermediate tank to complete the CHP decomposition. (*Id.*). Water or ammonia is also supplied to the intermediate tank. (*Id.*). The product exiting the intermediate tank is sent to a secondary DCP reactor for decomposing DCP and DMBA at a temperature ranging from 80 to 90° C. (*Id.*).

We note that Dr. Zakoshansky's Reissue Declaration states that the '135 certificate:

[D]iscloses a process for the decomposition of CHP wherein CHP decomposition products are recycled to the CHP feedstream in the quantity of 20 times the weight of the CHP feedstream.

[D]iscloses a process for the decomposition of CHP to phenol and acetone wherein water is added to the recycle stream to the CHP decomposition reactor.

(HX 1011, ¶¶ 35 and 38).

Hertzog's expert, Dr. Levy, testifies that since only 5% of the stream is sent to the intermediate tank, one skilled in the art would understand that the intermediate tank and the subsequent DCP reactors were significantly smaller in size than the CHP reactors. (HX 1024, ¶ 39). Dr. Levy also testifies that the '135 CHP decomposition is a non-isothermal process since the reaction mass is sent from the CHP decomposition reactor to two cooling stage reactors. (*Id.* at ¶ 42, "The temperature of the reaction mass necessarily decreases in the these two heat exchangers, which are coolers."). Table 1 of the '135 certificate reports the values of phenol and acetone concentrations for different process parameters. (HX 1005A, p. 135.6). Using the values provided in Table 1 of the '135 certificate, Dr. Levy calculates the amount of residual CHP in the reaction mass in as about 1.4 wt%. (HX 1024, ¶ 41). Zakoshansky disagrees with Hertzog's calculation arguing that the relationship between temperature differential and extent of CHP decomposition was not known in the art and that the publication relied upon by Hertzog and Levy to demonstrate a relationship was a later publication by Zakoshansky's company. (Paper No. 52, ¶¶ 7 and 49).

Hertzog's claim charts fail to identify where the '135 certificate teaches all the material limitations recited in Zakoshansky claims 1-20, 22-31, 33-38 and 40-41. For example, Hertzog fails to identify where the '135 certificate teaches the use of excess acetone, recycling acetone from the DCP reactor or conducting the CHP decomposition in a multiplicity of reactors having a "controlled temperature range." (See, Paper No. 30, Appendix A). Additionally, Hertzog fails to provide credible evidence that the use of "technical CHP," as taught by the '135 certificate, expressly suggests Zakoshansky's claimed technical CHP containing 10-18% cumene.

Accordingly, we deny the portion of Hertzog Preliminary Motions 1 and 2 that alleges that Zakoshansky's claims are anticipated by the '135 certificate.

2. Obviousness

In addition to alleging that Zakoshansky's involved claims are anticipated by Zakoshansky's certificates, Hertzog alleges that Zakoshansky's claimed subject matter would have been obvious over the combined teachings of the certificates taken in light of the teachings of Sifniades. (Paper No. 30, p. 25 and Appendix B). Zakoshansky opposes. In particular, Zakoshansky alleges that section 102(d) certificates may not be combined for the purposes of section 103 and that, even if they could be combined, there was no motivation to combine the teachings of the certificates, let alone combine the certificates with Sifniades. (Paper No. 52, pp. 23-25).

a. Section 102(d) References May be Considered in Determining Obviousness under Section 103

Section 103 does not explicitly state one way or the other that references under section 102(d) may be used in an obviousness determination. To understand whether such references fall within the gambit of section 103 we again turn to the language of sections 102(d) and 103, their legislative history and to the opinions of the Federal Circuit, the Court of Claims and Patent Appeals (CCPA) as well as the Board of Patent Appeals and Interferences (BPAI). *Hughes Aircraft Co. v. Jacobson*, 525 U.S. 432, 438 (1999); *Blue Chip Stamps v. Manor Drug Stores*, 421 U.S. 723, 756 (1975) ("The starting point of every case involving construction of a statute is

the language itself.”); *United States v. John C. Grimberg Co.*, 702 F.2d 1362, 1365, 1369 (Fed. Cir. 1983) (“Because it is our duty to carry out the intent of the Congress, to the fullest extent to which it is discoverable, we devote extended discussion to the statute’s [Title 28, Section 1491(a)(3)] legislative history.”)

I. Statutes and Legislative Histories

35 U.S.C. 102 is entitled: “Conditions for patentability; novelty and loss of right to patent.” Section 102(d)¹⁹ provides that a person shall be entitled to a patent unless:

[T]he invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States.

35 U.S.C. 103 is entitled: “ Conditions for patentability; non-obvious subject matter.” Section 103(a) provides that:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

As apparent from the plain language of section 103, a patent may not be obtained where the differences between the subject matter sought to be patented and the “prior art” are such that the

¹⁹A 1974 amendment to section 102(d) added the language “or was the subject of an inventor’s certificate.”

subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of the invention.

The language contained in section 103(a) arose from the Patent Act of 1952. 2 D. Chisum, Patents §5.02[4], pp. 32-33 (rev. ed. 2003). Regarding the Patent Act of 1952, the Federal Circuit opinion in *Symbol Technologies Inc. v. Lemelson Medical, Education & Research Foundation LP*,²⁰ observed that:

Shortly after the passage of the Act, P.J. Federico, one of its original drafters, gave a series of lectures across the country to educate patent groups about the new Act. The lectures were transcribed, edited, and published. P.J. Federico, *Commentary on the New Patent Act*, 75 J. Pat. & Trademark Off. Soc'y 161 (1993) (reprinted from 35 U.S.C.A. 1954 ed.). Prior to publication, Federico "submitted drafts of the commentary to [Henry] Ashton and the Drafting Committee for suggestions ..." *Paulik v. Rizkalla*, 760 F.2d 1270, 1277 [226 USPQ 224] (Fed. Cir. 1985) (en banc) (Rich, J., concurring). The Drafting Committee consisted of Judge Giles S. Rich, late of this court, and Paul Rose. See Giles S. Rich, *Congressional Intent — Or, Who Wrote the Patent Act of 1952*, in *Patent Procurement and Exploitation* (BNA 1963), reprinted in *Nonobviousness — The Ultimate Condition of Patentability* (John F. Witherspoon ed., 1980). Federico's commentary is an invaluable insight into the intentions of the drafters of the Act.

Id. at 1366; 61 USPQ2d at 1518-19, brackets and italics in original. As such, to better understand the term "prior art" in section 103(a) as understood by Federico, we turn to Federico's commentary, which states that:

The Committee Report states, in the general part, that one of the two "major changes or innovations" in the new statute consisted in "incorporating a requirement for invention in section 103." Section 103 states that "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having

²⁰ 277 F.3d 1361; 61 USPQ2d 1515 (Fed. Cir. 2002)

ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.”

In this form this section is a limitation on section 102 and it should more logically have been made part of section 102, but it was made a separate section to prevent 102 from becoming too long and involved and because of its importance. The antecedent of the word “the prior art,” which here appear in a statute for the first time, lies in the phrase “disclosed or described as set forth in section 102” and hence these words refer to material specified in section 102 as the basis for comparison.

The general part of the Committee report states with reference to section 103:

“Section 103, for the first time in our statute, provides a condition which exists in law and has existed for more than 100 years, but only by reason of decisions of the courts. An invention which has been made, and which is new in the sense that the same thing has not been made before, may still not be patentable if the difference between the new thing and what was known before is not considered sufficiently great to warrant a patent. That has been expressed in a large variety of ways in decisions of the courts and in writing. Section 103 states this requirement in the title. It refers to the difference between the subject matter sought to be patented and *the prior art, meaning what was known before as described in section 102*. If this difference is such that the subject matter as a whole would have been obvious at the time to a person skilled in the art, then the subject matter cannot be patented.

Commentary on the New Patent Act, 75 J. Pat. & Trademark Off. Soc'y at 180-181, emphasis added. As made apparent by Federico's commentary and the committee report, the phrase “prior art” was intended to refer to the material set forth in section 102, which includes section 102(d).

Congress has made several amendments to section 103 since 1952. Of note, in 1984

Congress amended section 103 to include the following language:

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

2 D. Chisum, Patents §5.02[4], p. 64.²¹ The amendment was explained in a report entitled “Section-By-Section Analysis of H.R. 6286, Patent Law Amendments Act of October 1, 1984” that was inserted into the Congressional Record of October 1, 1984 by Representative Kastenmier, Chairman of the Subcommittee on Courts, Civil Liberties and the Administration of Justice of the Committee on the Judiciary. 9 D. Chisum, Patents Appendix 22, p. 1. According to the report:

“Prior art” is the existing technical information against which the patentability of an invention is judged. Publically known information is always considered in determining whether an invention is obvious. However, under *In re Bass*, 474 F.2d 1276, 177 USPQ 178, (C.C.P.A. 1973), and *In re Clemens*, 622 F.2d 1029, 206 USPQ 289 (C.C.P.A. 1980), an earlier invention which is not public may be treated under section 102(g), and possibly under 102(f), as prior art with respect to a later invention made by another employee of the same organization.

New technology often is developed by using background scientific or technical information known within an organization but unknown to the public. The bill by disqualifying such background information from prior art, will encourage communication among members of research teams, and patenting, and consequently public dissemination, of the results of “team research.”

The subject matter which is disqualified as prior art under section 103 is strictly limited to subject matter which qualifies as prior art only under sections 102(f) or (g). **If the subject matter qualifies as prior art under any other subsection - e.g., subsection 102(a), (b) or (e) - it would not be disqualified as prior art under the amendment to section 103.**

Id. at 10, italics in original, bold emphasis added.

Representative Kastenmier’s commentary identifies the 1984 amendment as providing a limited exemption for sections 102(f) and (g) from 103 and identifies sections 102 (a), (b) and (e)

²¹The quoted language was amended in 1999 to read “under one or more of subsections (e), (f) and (g)” and now forms a part of section 103(c)(1). 2 D. Chisum, Patents §5.03[c][vi], p. 158-9.

as examples of prior art sections that are not exempted. Representative Kastenmier's commentary that "(a), (b) or (e)" are examples of prior art other than sections (f) or (g), is consistent with Federico's statement that all sections of 102 are to be considered prior art.

ii. Case Law Regarding "Prior Art" Status of Section 102(d)

There are very few decisions of the BPAI, the CCPA, and the Federal Circuit that concern section 102(d) and even fewer that discuss this section with regards to section 103. Provided below is a discussion of the case law cited by the parties and its relevance to the facts of this interference.

*In re Bass*²²

In re Bass involved an appeal from the Board of Patent Appeals²³ that affirmed a rejection of Bass's claims 1-9 as unpatentable over section 102(g) prior inventions of the named inventors taken in combination with additional prior art. As identified by the CCPA, an issue raised on appeal was:

[W]hether § 102(g) makes available as "prior art," within the meaning of 103, the prior invention of another who has not abandoned, suppressed or concealed it.

474 F.2d at 1277, 177 USPQ at 179. On the facts presented, the majority opinion written by Judge Rich upheld the Board's determination that section 102(g) was prior art for purposes of

²²474 F.2d 1276, 177 USPQ 178 (CCPA 1973).

²³The decision in *Bass* occurred prior to the merger of the Board of Interferences with the Board of Patent Appeals.

section 103 and affirmed the rejection of claims 2-5 and reversed as to claims 1 and 6-9. Two concurring opinions accompanied the majority opinion, one by Judge Lane agreeing that section 102(g) prior inventions of another were available as "prior art" under section 103 and the other concurrence by Judge Baldwin disagreeing with this position.

Under the heading "Comments on Judge Baldwin's Concurring Opinion," the majority wrote:

The concurrence makes the erroneous statement that in past cases we have based our thinking on "the proposition that *everything* in section 102 is prior art" (original emphasis). The anatomy of § 102 is fairly clear. As forecast in its heading, it deals with the two questions of "novelty and loss of right." It also deals with originality in subsection (f) which says that one who "did not himself invent the subject matter" (i.e., he did not originate it) has no right to a patent on it. Subsections (c) on abandonment and (d) on first patenting the invention abroad, before the date of the U. S. application, on an application filed more than a year before filing in the U. S., are loss of right provisions and in no way relate to prior art. Of course, (c), (d), and (f) have no relation to § 103 and no relevancy to what is "prior art" under § 103. Only the remaining portions of § 102 deal with "prior art." Three of them, (a), (e), and (g), deal with events prior to applicant's *invention* date and the other, (b), with events more than one year prior to the U. S. *application* date. These are the "prior art" subsections.

Id. 474 F.2d at 1290, 177 USPQ at 189, emphasis in original.

As the decision in *Bass* did not involve a question of obviousness arising from art available under section 102(d), the commentary in *Bass* suggesting that section 102(d) is not prior art for purposes of section 103 is therefore dicta. Additionally, while the *Bass* majority opinion states that section 102(f) has no relation to section 103, we note that the 1984 amendment to section 103 explicitly exempts 102(f) subject matter from section 103 where the subject matter and the claimed invention was, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

*OddzOn Prods. Inc. v. Just Toys, Inc.*²⁴

OddzOn involved an appeal from a district court decision that granted summary judgment in favor of Just Toys on *OddzOn*'s claims of design patent infringement, trade dress infringement and state-law unfair competition as well as a cross-appeal of summary judgment in favor of *OddzOn* on Just Toys claim of patent validity. Of note, the district court determined that subject matter encompassed within the meaning of 35 U.S.C. Section 102(f) could be combined with other prior art for the purposes of determining validity under 35 U.S.C. Section 103. The Federal Circuit affirmed the district court's granting of the various summary judgments and specifically held that:

We therefore hold that subject matter derived from another not only is itself unpatentable to the party who derived it under Section 102(f), but, when combined with other prior art, may make a resulting obvious invention unpatentable to that party under a combination of Sections 102(f) and 103.

Id. 122 F.3d at 1403-04, 43 USPQ2d at 1646.

Regarding the question of whether section 102(f) is a prior art provision under section 103, the Federal Circuit in *OddzOn* opined that:

Section 102(f) provides that a person shall be entitled to a patent unless "he did not himself invent the subject matter sought to be patented." This is a derivation provision, which provides that one may not obtain a patent on that which is obtained from someone else whose possession of the subject matter is inherently "prior." It does not pertain only to public knowledge, but also applies to private communications between the inventor and another which may never become public. Subsections (a), (b), (e), and (g), on the other hand, are clearly prior art provisions. They relate to knowledge manifested by acts that are essentially public. Subsections (a) and (b) relate to public knowledge or use, or prior patents and printed publications; subsection (e) relates to prior filed applications for

²⁴122 F.3d 1396, 43 USPQ2d 1641 (Fed. Cir. 1997).

patents of others which have become public by grant; and subsection (g) relates to prior inventions of others that are either public or will likely become public in the sense that they have not been abandoned, suppressed, or concealed. Subsections (c) and (d) are loss-of-right provisions. Section 102(c) precludes the obtaining of a patent by inventors who have abandoned their invention. Section 102(d) causes an inventor to lose the right to a patent by delaying the filing of a patent application too long after having filed a corresponding patent application in a foreign country. Subsections (c) and (d) are therefore not prior art provisions.

Id. at 1401-02, 43 USPQ2d at 1644-45; *see also*, *Stelos Co. v. Hosiery Motor-Mend Corp.*, 295

U.S. 237, 55 S.Ct. 746 (1935). The *OddzOn* opinion further stated that:

Thus, the patent laws have not generally recognized as prior art that which is not accessible to the public. It has been a basic principle of patent law, subject to minor exceptions, that prior art is:

technology already available to the public. It is available, in legal theory at least, when it is described in the world's accessible literature, including patents, or has been publicly known or in . . . public use or on sale "in this country." That is the real meaning of "prior art" in legal theory--it is knowledge that is available, including what would be obvious from it, at a given time, to a person of ordinary skill in the art.

Kimberly-Clark Corp. v. Johnson & Johnson, 745 F.2d 1437, 1453, 223 USPQ 603, 614 (Fed. Cir. 1984) (citations omitted).

Id. at 1402, 43 USPQ2d at 1645.

While the Federal Circuit in *OddzOn* found the question of whether section 102(f) is a prior art provision under section 103 to be close, the Federal Circuit determined that the 1984 Amendment to section 103 provides an inescapable conclusion that it is. *Id.* at 1403, 43 USPQ2d at 1646.

The Federal Circuit's commentary regarding the status of section 102(d) was unrelated to the issues raised by the parties as to whether or not section 102(f) was a prior art provision. Accordingly, all comments regarding the status of section 102(d) are dicta, and while dicta has its

place it is not controlling authority.

*Ex parte Appeal No. 242-47*²⁵

Ex parte Appeal No. 242-47 involves a decision of the Board of Patent Appeals on a request for reconsideration. The issues raised in the request for reconsideration related to whether or not it was “improper to rely upon the ‘De’livre’ date of the appellant’s French patent as its effective date,” and whether it was “improper to combine the French patent with other references (patents) to reject the claims on appeal.” *Id.* at 829.

In analyzing the question of combining section 102(d) references with prior art, the Board first determined that the CCPA’s commentary provided in *Bass* was “non-controlling dicta.” The Board then analogized the question in terms of obviousness type double patenting as follows:

Moreover, the situation with respect to 102(d), in our opinion, is analogous to an obviousness type of double patenting fact situation. In both cases it is the appellant’s actions, viz. in the one case [102(d)] permitting a foreign patent to be granted, and the other case (double patenting) permitting a United States patent to be granted, which bar the appellant’s right to a patent on subject matter which would have been obvious from the patented subject matter. It would be anomalous to permit an applicant to obtain a patent upon subject matter which is obvious from subject matter already patented in a foreign country under the conditions set forth in section 102(d), but not to permit him to obtain a patent on subject matter which is obvious from subject matter patented in the United States. The applicant in both cases is in the same boat, and should suffer the same consequences.

Id. at 829-30.

²⁵196 USPQ 828 (Bd. App. 1976).

*Ex parte Andresen*²⁶

Ex parte Andresen is a Board of Patent Appeals decision where the “principal legal issue” was whether or not admitted prior activities of another could be combined with three issued patents under sections 102(f)/103 to render the claims on appeal unpatentable. *Id.* at 101. On the facts presented, the Board determined that section 102(f) was a “prior art” provision for purposes of section 103 and upheld the examiner’s rejection of the appealed claims.

In analyzing the question of section 102(f) as a “prior art” provision, the Board reviewed the CCPA decision in *Bass* as well as Federico’s commentary concerning the 1952 Patent Act. The Board began by noting that *Bass* stated that section 102(f) was not a prior art provision but that this identification was non-controlling dicta. *Id.* With respect to Federico’s commentary, the Board determined that “it appears to us that the commentator and the committee viewed section 103 as including all of the various bars to a patent as set forth in section 102.” *Id.* at 102. The Board did recognize however, that some of the bars in section 102 were applicable only to a particular applicant, *e.g.*, section 102(c) applies only against the specific applicant that previously abandoned his or her invention. *Id.* We note however, that *Andresen* is dicta on the issue of whether a section 102(d) reference is prior art as that issue was not directly before the *Andresen* panel.

²⁶212 USPQ 100 (Bd. App. 1981).

iii. Analysis of Sections 102(d)/103 Taken in View of the
Legislative Commentary and Decisions of the Board,
CCPA and Federal Circuit

The policy and purpose of section 102(d) is to encourage applicants to exercise reasonable promptness in filing applications in the United States when an applicant has previously filed for and received a patent or inventor certificate in a foreign country. *In re Kathawala*, 9 F.3d 942, 946, 28 USPQ2d 1785, 1788 (Fed. Cir. 1993) (citing Donald S. Chisum, *Patents*, Section 6.04[1] (1993)). The interpretation of the term “prior art” in section 103 that is most harmonious with the statutory scheme and the policy behind enacting section 102(d) is that a section 102(d) reference is prior art under section 103 as against the foreign applicant that has failed to exercise reasonable promptness in filing in this country. *Cf.*, *C.I.R. v. Engle*, 464 U.S. 206, 217 (1984) (Choose the interpretation that is most harmonious with the statutory scheme and with the general purposes that Congress manifested.). To hold otherwise would allow inventors to file disclosures in foreign countries that narrowly describe their invention, but provide dominating claim coverage, and after a prolonged period of time, file an application in the United States that describes and claims other subject matter that would have been obvious, *e.g.*, describe and claim a compound in foreign application and after a prolonged period of time file an application in U.S. describing and claiming other commercially useful, and obvious, compositions and methods involving the compound claimed in the foreign application.

Our decision that a section 102(d) reference is “prior art” is consistent with Federico’s commentary and the committee report for the 1952 patent act as well as Representative Kastenmier’s commentary concerning the 1984 amendment to section 103, all of which indicate

that section 102(d) art is not excluded from the term “prior art” as it appears in section 103. Our decision is also consistent with the Board of Patent Appeals decision in *Ex parte Andresen*, which cites and relies upon Federico’s comments and the committee report, and the decision in *Ex parte Appeal No. 242-47*. Of note, we generally agree with the rationale set forth in *Ex parte Appeal No. 242-47* that a foreign applicant should not be permitted to extend or delay the filing of an application in the United States that claims subject matter that would have been obvious over an invention for which rights were already procured in a foreign country.²⁷

The distinctions between section 102(d) and “prior art” sections 102(a), (b), (e), (f), and (g) cited in *Bass* (loss of right) and *OddzOn* (loss of right, public activity) have been considered

²⁷We note that section 25 of the act of July 8, 1870, a statutory precursor of section 102(d), was interpreted by the Commissioner of Patents as follows:

The intention of Congress was obviously to obtain for this country the free use of the inventions of foreigners as soon as they became free abroad. This is indicated by the use of the phrase “first patented or caused to be patented in a foreign country,” for it was presumable that American citizens would first obtain their first patent here, while a foreigner would first patent his invention in his own country.

The statute was designed to prevent a foreigner from spending his time and capital in the development of an invention in his own country, and then coming to this to enjoy a further monopoly when the invention had become free at home. The result of such a course would be, that, while the foreign country was developing the invention and enjoying its benefits, its use could be interdicted here; while, if the term of the monopoly could be further extended here, the market could be controlled long after the foreign nation was prepared to flood this country with the unpatented products of the patented process.

Ex Parte Mushet, 1870 Dec. Com. Pat., 106, 108 (1870).

but are not deemed persuasive. In particular, both *Bass* and *OddzOn* identify section 102(b) as “clearly” being a prior art section. Yet, like section 102(d), section 102(b) contains loss of rights provisions. For example, in *D.L. Auld Co. v. Chroma Graphics Corp.*²⁸ the Federal Circuit stated that:

If Auld produced an emblem by the method of the invention and offered that emblem for sale before the critical date, the right to a patent on the method must be declared forfeited. *Metallizing Engineering Co. v. Kenyon Bearing & Auto Parts Co.*, 153 F.2d 516, 68 USPQ 54 (2nd Cir. 1946). The “forfeiture” theory expressed in *Metallizing* parallels the statutory scheme of 35 U.S.C. §102(b), the intent of which is to preclude attempts by the inventor or his assignee to profit from commercial use of an invention for more than a year before an application for patent is filed. The record includes testimonial and documentary evidence establishing that the claimed method was employed in preparing a number of sample emblems and that Auld attempted to profit from use of that method by offering some of those samples for sale to a number of potential buyers well before the critical date. Those facts operate to create a forfeiture of any right to the grant of a valid patent on the method to Auld.

Where a method is kept secret, and remains secret after a sale of the product of the method, that sale will not, of course, bar another inventor from the grant of a patent on that method. The situation is different where, as here, that sale is made by the applicant for patent or his assignee. Though the magistrate referred to §102(b), he did so in recognizing that the “activity” of Auld here was that which the statute “attempts to limit to one year.” In so doing, the magistrate correctly applied the concept explicated in *Metallizing*, i.e. that a party’s placing of the product of a method invention on sale more than a year before that party’s application filing date must act as a forfeiture of any right to the grant of a valid patent on the method to that party if circumvention of the policy animating §102(b) is to be avoided in respect of patents on method inventions.

Id. at 1147-48, 219 USPQ at 15-16. As apparent from *Auld*, contrary to the “prior art” distinctions identified in *Bass* and *OddzOn*, an inventor may lose his or her right to a patent regardless of whether the invention was kept secret and that this loss of right occurs under “prior

²⁸714 F.2d 1144, 219 USPQ 13 (Fed. Cir. 1983).

art” section 102(b). Our conclusion that section 102(d) is “prior art” under section 103 is similar to the holding in *Auld*, as our conclusion encourages an applicant filing in a foreign country to exercise reasonable promptness in filing an application direct to its invention and subject matter that would have been obvious over the foreign filed disclosure in the United States after seeking and obtaining beneficial rights (patent, inventor certificate) in a foreign country. Additionally, even if a distinction may be made regarding secret and public knowledge for purposes of defining section 103 “prior art,” we note that Zakoshansky’s admitted section 102(d) art (author certificates ‘135, ‘181, ‘030 and 937) were made available to the public on February 15, 1992, which is prior to Zakoshansky’s U.S. effective filing date of September 14, 1992. (HX 1011, ¶ 8 and HX 1013, ¶ 14).

A parallel may be noted between section 102(b) and 102(d). In both cases, a bar is created against an applicant who was aware of the invention, but did not “timely” take action to reveal the invention. This one-year portion of the bar is a policy determination on the part of Congress to permit applicants one year to file on their invention. To the extent a process is known only to an applicant, section 102(b) may bar a process patent to the applicant but not another. *See, Torpharm Inc. v. Ranbaxy Pharmaceuticals Inc.*, 336 F.3d 1322, 1327, 67 USPQ2d 1511, 1514 (Fed. Cir. 2003); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 310 (Fed. Cir. 1983) (Secret commercialization of process does not bar third party from obtaining patent). Section 102(d) would operate in the same way. Its effect is only against the applicant who filed in the foreign country - - not the same innocent bystander who is unaware of the foreign filing but proceeds to promptly file in the United States. Failure to

include section 102(d) as a prior art provision under section 103 as to the applicant first filing in a foreign country would serve to undermine the concept that “[e]arly public disclosure is a linchpin of the patent system.” *Gore* 721 F.2d at 1550, 220 USPQ at 310. Likewise, failure to include section 102(d) as a prior art provision would encourage inventors to manipulate filing, all to the detriment of the U.S. economy - - the purpose of which the patent system is assigned to serve.

b. Comparison of Zakoshansky’s Involved Claims with the Prior Art

We have already determined that Zakoshansky claims 2, 4, and 7-9 are anticipated by Zakoshansky’s ‘181 certificate under 35 U.S.C. §102(d). Anticipation is the epitome of obviousness and, as such, hold that Zakoshansky claims 2, 4 and 7-9 are obvious over Zakoshansky’s ‘181 certificate, taken in light of the knowledge of one of ordinary skill in the art. *In re McDaniel*, 293 F.3d 1379, 1384, 63 USPQ2d 1462, 1466 (Fed. Cir. 2002).

Provided below is a review of the obviousness of Zakoshansky’s remaining claims 1, 3, 5-6, 10-20, 22-38 and 40-41 taken in light of the prior art cited in Hertzog Preliminary Motions 1 and 2.²⁹ Of note, Hertzog Preliminary Motions 1 and 2 do not identify Messina as evidence relied upon. Thus, while Messina describes the advantages of excess acetone for a CHP decomposition process, we will not consider Messina’s teachings when analyzing the arguments presented in Hertzog Preliminary Motions 1 and 2.

²⁹As mentioned above, Zakoshansky did not attempt to distinguish its claims 21 and 39 over Sifniades and Messina and we will not separately review the obviousness of these claims over the additional prior art contained within Hertzog Preliminary Motions 1 and 2.

Zakoshansky Claim 1

Dr. Zakoshansky has admitted in his Reissue Declaration that all the limitations of his issued claim 1 were described by his '181 Author Certificate. (HX 1011, ¶ 14). Specifically, Dr. Zakoshansky identifies Example 2 of the '181 certificate as describing a process for acid catalyzed decomposition of CHP to phenol and acetone in the presence of excess acetone where the molar ratio of acetone to phenol is 1.42:1. (*Id.*). Dr. Zakoshansky states that Example 2 of the '181 certificate describes a process that reduces the rate of CHP decomposition and a reaction that is more controllable and selective. (*Id.*). Dr. Zakoshansky also admits that Example 2 of the '181 certificate describes the use of sulfuric acid as the acid catalyst. (*Id.* at ¶ 17).

Zakoshansky argues that the '181 certificate does not teach all the limitations of Zakoshansky reissue claim 1. According to Zakoshansky, the '181 certificate describes an isothermal as opposed to non-isothermal process, describes the addition of acetone in both the first and second stages of the process, and fails to teach or suggest the use of technical CHP that contains 10-18 wt% cumene. (Zakoshansky Opposition 1, Paper No. 52, Appendices A and B). As discussed above with respect to anticipation, we credit the Reissue Declaration of Dr. Zakoshansky and find that the '181 certificate describes a non-isothermal process and also construe the "comprising" transition phrase of Zakoshansky claim 1 as opening the claim to the additional step of adding acetone to the "second stage" (DCP decomposition reactor).

We agree with Zakoshansky that the '181 certificate does not explicitly teach the use of technical CHP containing 10-18 wt% cumene. Rather, the '181 certificate generally describes and claims a process of decomposing "technical grade" CHP and exemplifies the use of technical

grade CHP having 1.2 wt% cumene. (HX 1006a, p. 2, line 26-28, Examples and Claim).

Sifniades describes a CHP decomposition process whereby technical CHP (a cumene oxidation product mixture containing CHP) is decomposed in the presence of an acid catalyst. (ZX 2006, col. 2, lines 58-60). In the CHP decomposition DCP is formed. (*Id.* at col. 2, lines 60-61). As previously discussed, Sifniades, like the '181 certificate, conducts the exothermic CHP decomposition in a non-isothermal process involving multiple, sequential reactors (backmix reactor and plug-flow cleanup reactor). Sifniades exemplifies an acid catalyzed decomposition of technical CHP where the technical CHP contains 13% cumene. (*Id.* at Examples 9-12).

Hertzog's expert, Dr. Levy, testifies that one skilled in the art would have recognized and appreciated the similarity between the process and chemistry of the Zakoshansky certificates and that of Sifniades. (HX 1024, ¶ 77). Levy further testifies that one skilled in the art would have found those details not disclosed in Zakoshansky's certificates, but disclosed in Sifniades, to be obvious when read in light of Sifniades. (*Id.*). Dr. Levy specifically identifies Sifniades as teaching the use of a technical CHP having 13 % by weight cumene and testifies that the advantages of using reduced amounts of CHP and increased amounts of cumene were well known. (*Id.* at ¶¶ 79-80). In particular, Dr. Levy states that a lower percentage of CHP allows for a more stable and controllable CHP decomposition process. (*Id.* at ¶ 80). Given the close similarity between the Zakoshansky certificates and Sifniades CHP decomposition processes, Dr. Levy testifies that one skilled in the art would have been motivated to employ the technical CHP of Sifniades (13 wt% cumene) as the technical CHP in the '181 CHP decomposition process. (*Id.*). Zakoshansky disagrees with Dr. Levy's testimony and argues that Dr. Levy fails to

properly support his opinion that one skilled in art would have been motivated to employ the technical CHP of Sifniades in the technical CHP decomposition process identified in Zakoshansky's certificates. (Paper No. 52, ¶ 84 and Appendix 1, claim 1).

CHP decomposition is a very exothermic reaction. (HX 1004, col. 1, lines 6-11; HX 1024, ¶ 22). We credit Dr. Levy's testimony that employing a reduced amount of CHP will provide a more controllable reaction as the CHP will be more dilute and decompose at a slower rate. We conclude that one skilled in the art desiring a more controllable reaction would employ the technical CHP of Sifniades, which contains 13 wt% cumene, as the technical CHP for Zakoshansky's '181 certificate. We hold that Zakoshansky claim 1 is obvious over the '181 certificate read in light of the teachings of Sifniades.

Hertzog's claim charts attached to Hertzog Preliminary Motions 1 and 2 cite to the '135, '937 and '030 certificates as describing various elements of Zakoshansky claim 1. Consideration of the citations to the '135, '937 and '030 certificates is moot in light of our decision that Zakoshansky claim 1 is obvious over the '181 certificate taken in light of Sifniades.

Zakoshansky Claim 3

Zakoshansky claim 3 is generally directed to a non-isothermal CHP decomposition process that employs excess acetone that is added according to a specifically defined algorithm, $G_{\text{acetone}} = G_{\text{chp}}(0.17)([\text{CHP}]) + 40/G_{\text{chp}}[\text{CHP}]$. Hertzog alleges that the '181 certificate describes a species of this algorithm. (Paper No. 30, Appendix B). Zakoshansky disagrees and identifies the '181 certificate as describing the addition of acetone to a first and a second stage

using two distinct algorithms: 1) $Y = 36.61 - 0.832X$ for first stage, and 2) $Y = 18.76 - 0.27X$ for the second stage.

Hertzog, as moving party, bears the burden of proving that it is entitled to the relief requested. Hertzog fails to properly explain how the algorithms described in the '181 certificate are "species" of the algorithm of Zakoshansky claim 3. Additionally, Hertzog's claim charts cite to the '135 certificate as teaching the preamble of claim 3, but do not identify the '135 certificate as describing the required algorithms. Based upon the record presented, Hertzog fails to meet its burden of proof with respect to Zakoshansky claim 3.

Zakoshansky Claim 5

Zakoshansky claim 5 depends upon claim 4 and further requires that the CHP decomposition method of claim 4 employ a first reactor that has a temperature range of about 50° to 62° C., a second reactor that has a range of about 62° to 57° C., and a third reactor with a range of about 57° to 50° C. Hertzog alleges that this range is inherently disclosed in the '135 and '181 certificates. (Paper No. 30, Appendix B). Zakoshansky disagrees. (Paper No. 52, Appendix 1).

As discussed above, Hertzog fails to properly identify and explain why the specifically claimed temperature ranges are "inevitable" as opposed to mere possibilities or why the '135 or '181 certificates suggest these temperature ranges. On the record presented, Hertzog fails to meet its burden of proof regarding Zakoshansky claim 5.

Zakoshansky Claim 6

Zakoshansky claim 6 depends upon claim 4 and further requires that the outlet stream of the last CHP decomposition reactor be passed into a reactor of plug flow design and smaller size compared to the decomposition reactor and requires that the delta T° C. for the inlet and outlet temperature of the plug flow reactor to range from 4 to 16° C. According to Hertzog, these limitations are described by the '135 certificate. (Paper No. 30, Appendix B).

Hertzog identifies the '135 certificate as describing the passage of a portion of the CHP decomposition products into an intermediate tank from which they are transferred to a DCP decomposition reactor. (*Id.*). As testified by Dr. Levy, only 5% of the CHP decomposition product is transferred to the intermediate tank and the DCP reactor and one skilled in the art would be motivated to employ a DCP decomposition reactor of significantly smaller size relative to the CHP decomposition reactors. (HX 1024, ¶ 39). We credit Dr. Levy's testimony on this point and conclude that the '135 certificate suggests passing a portion of the last sequential CHP decomposition reactor to an intermediate tank and then onto a DCP decomposition reactor, which may be plug flow, where one skilled in the art is motivated to employ a DCP decomposition reactor of smaller size than the CHP decomposition reactors.

Zakoshansky contends that passing a portion of the last sequential CHP decomposition reactor to an intermediate tank is distinct from passing a portion to the claimed plug flow reactor. (Paper No. 52, Appendix 1). Zakoshansky claim 4, from which claim 6 depends, contains the "comprises" transition language. As such, we construe Zakoshansky claim 6 as open to the inclusion of an intermediate tank between the last sequential CHP decomposition reactor and the

plug flow DCP decomposition reactor. *Medichem*, 353 F.3d at 933, 69 USPQ2d at 1287

(Comprising transition language open to the inclusion of additional process steps).

Hertzog also identifies Table 1 of the '135 certificate as describing Zakoshansky's claimed 4 to 16° C. delta T° C. between the inlet and outlet temperature of the plug flow reactor. (Paper No. 30, Appendix B). Zakoshansky contends that Table 1 discloses delta T's of 4, 8, 10, 15 and 20° C. where most values are 10° C. but that this Table refers to the temperature differential between the inlet and outlet of the intermediate tank rather than the DCP plug-flow reactor. (Paper No. 52, Appendix 1, ZX 2023, ¶ 121 and ZX 2024).

Hertzog takes the position that the intermediate tank of the '135 certificate could have plug flow characteristics. Specifically, Dr. Levy testifies for Hertzog that:

In addition, those skilled in the art would be aware that calorimetry is often carried out in a plug flow reactor, and would recognize the intermediate vessel ("tank") in which the residual CHP is decomposed could have plug flow characteristics. In the art, a "tank" is often a wider section of pipe which maintains the fluid's plug flow characteristics while increasing flow residence time. Even if an overhead space is required in the tank, those skilled in the art would understand that this could be accomplished using interior baffles, so that the flow would have plug flow characteristics.

(HX 1024, ¶ 37).

Obviousness requires a motivation or suggestion to combine or modify prior art references, coupled with a reasonable expectation of success. *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000). Dr. Levy's testimony demonstrates that one skilled in the art "could" design the intermediate tank of the '135 certificate to have plug flow characteristics. Yet, Dr. Levy's testimony fails to provide a credible basis for concluding that one skilled in the art would have been motivated to

make such a modification.

Hertzog's expert, Dr. Levy, identifies the '135 certificate as describing the measurement of the temperature difference across the DCP plug-flow reactor. (HX 1024, ¶ 38; HX 1005a, Claims, p. 135.7, lines 12-16). Dr. Levy recognizes however, that this measurement "would be understood to be a measurement of the completeness of the decomposition of the DCP" as opposed to the CHP and Dr. Levy does not identify why the '135 certificate teaches or suggests that this temperature differential is between 4 to 16° C. (*Id.*).

Hertzog, as moving party, bears the burden of proof as to the relief requested. Hertzog fails to meet this burden with respect to Zakoshansky claim 6.

Zakoshansky Claim 10

Zakoshansky claim 10 generally requires a non-isothermal, sulfuric acid catalyzed, CHP decomposition process that occurs in the presence of excess acetone wherein the quantity of CHP remaining after decomposition ranges from 0.3 to 1.5 wt% of the total weight of the decomposition products. Hertzog generally alleges that all limitations are taught in the '135 and '181 certificates. In particular, Hertzog alleges that it can be mathematically determined that the embodiments in Table 1 of the '135 certificate that have a 10° C. temperature differential have a CHP decomposition product containing about 1.4 wt% CHP. (Paper No. 30, ¶ 49, Appendix B and HX 1024, ¶¶ 41, 56, and 57).

Zakoshansky contends that Hertzog fails to explain how the mathematical calculations were made to determine the residual 1.4 wt% CHP in the '135 certificate. We agree.

Dr. Levy's declaration states that a 1% residual CHP in the reaction mass will result in a 7° C. temperature change. Dr. Levy, using the 10° C. temperature differential from Table 1 of the '135 certificate, determined that a 1.4 wt% CHP was present. This calculation is flawed. At best, the calculation provides a basis for finding that 1.4% CHP was decomposed, which is different than calculating how much was present to begin with. Further, Dr. Levy fails to explain why the temperature differential is due solely to the decomposition of the CHP. Based upon the facts presented, Hertzog fails to meet its burden of proving that, given the teachings in Zakoshansky's '135 and '181 certificates, it would have been obvious to one of ordinary skill in the art to have the residual CHP amounts set forth in Zakoshansky claim 10.

Additionally, Hertzog's claim charts for Zakoshansky claim 10 cite the '937 certificate as describing Zakoshansky's preamble and the '030 certificate as describing the use of sulfuric acid as a catalyst. These two citations to the '937 and '030 certificates fail to motivate one skilled in the art to arrive at a quantity of CHP remaining after decomposition that ranges from 0.3 to 1.5 wt% based upon the total weight of the decomposition products.

We note that in the Statement of Material Fact section of Hertzog Preliminary Motion 1, Hertzog identifies the Sifniades patent as describing a residual CHP level of from 0.5 to 5 wt%, preferably 0.8 to 2.0 wt% in order to effect substantial transformation of the DMBA and CHP into DCP. (Paper No. 30, ¶ 116). Hertzog's attached Appendices comparing claim 10 against the prior art did not discuss, let alone identify, this teaching in Sifniades. As Hertzog's claim charts did not identify this teaching in Sifniades and as Zakoshansky failed to distinguish its claim 10 over the Sifniades and Messina prior art cited in Zakoshansky Preliminary Motion 1, we

will not undertake a separate review of the obviousness of Zakoshansky claim 10 over Zakoshansky's certificates taken in light of the Sifniades patent. *Cf., Genentech v. Amgen*, 289 F.3d 761, 774, 62 USPQ2d 1640, 1649 (Fed. Cir. 2002) (Genentech precluded from proceeding on a theory of infringement under the doctrine of equivalents because Genentech did not expressly include that theory in a claim chart as required by local rules).

Zakoshansky Claim 11

Zakoshansky claim 11 is directed to a CHP decomposition process that comprises decomposing CHP in the presence of an acidic catalyst and excess acetone, and in a separate vessel decomposing DCP at a temperature of from 80 to 100° C. The decomposition products are then fed to a separate vessel where the acetone is evaporated, recovered and recycled to the CHP decomposition reactor.

Hertzog identifies the '181 certificate as teaching all the limitation of Zakoshansky claim 11. The '181 certificate describes a CHP decomposition process that has a CHP decomposition stage and a DCP decomposition stage. (HX 1006a, pp. 2-3). Excess acetone is supplied to the first reactor of the process. (*Id.*). The CHP decomposition is conducted in the presence of sulfuric acid catalyst and the decomposition product is sent to a plug-flow reactor where the decomposition product is held at a temperature of 85 to 105° C. (HX 1006a, Claims). The DCP is decomposed in the plug-flow reactor. (See, HX 1024, ¶¶ 53-55 and Sifniades, col. 2, lines 19-43 (sending CHP decomposition product to plug-flow reactor with elevated temperature to decompose DCP to AMS, phenol and acetone)). The '181 certificate does not explicitly teach

the recovery of the acetone from the DCP decomposition product and recycling the recovered acetone.

Zakoshansky's expert, Mr. Fulmer, testifies that it was well known in the art to use evaporation to recover low boiling components, such as acetone, from higher boiling components, such as phenol, cumene and AMS, by continuous distillation. (ZX 2001, ¶ 110).³⁰

Regarding recycling acetone, Mr. Fulmer testifies that:

It was therefore the suitable and obvious means for obtaining acetone, which could be recycled to the decomposition reactor for the purpose of increasing acetone content in this reactor. It would not matter if the evaporated acetone also contained some of the other CHP decomposition products because all of these other components were already present in the CHP decomposition reactor.

(*Id.* at 113). We credit Mr. Fulmer's testimony on this point and conclude that one skilled in the art desiring excess acetone in the first CHP decomposition reactor of the '181 certificate would employ the well known distillation recovery technique and recycle the recovered acetone to the CHP decomposition reactor.

Zakoshansky argues that the '181 certificate teaches the addition of the acetone in two stages whereas the claim adds the acetone to only the first. (Paper No. 52, Appendix 1; ZX 2023, ¶130). Zakoshansky claim 11 is written with the "comprises" transition phrase and it is open to the inclusion of additional unrecited steps, such as the addition of acetone to a second stage of the process.

³⁰Zakoshansky relied upon Mr. Fulmer's declaration testimony to establish that Hertzog's claimed recycling of acetone was obvious to one skilled in the art. (Zak. Prel. Mot. 1, Paper No. 46, relying on Zak. Master Claim Chart, ZX 2002, Hertzog claim 43).

Zakoshansky claim 11 requires that the selectivity of AMS is enhanced. Zakoshansky and its expert, Mr. Fulmer, state that the '181 certificate discloses increased yields of AMS but "does not disclose that those increases are due to the process of Claim 11." (Paper No. 52, Appendix 1, Claim 11, p. 28; ZX 2023, ¶ 155). Zakoshansky and its expert, Mr. Fulmer, fail to identify how the '181 certificate's process with its increased AMS yield differs from the process of Zakoshansky claim 11 with its claimed enhancement of AMS selectivity.

Based on the record presented, we conclude that Hertzog has met its burden of proof with regards to Zakoshansky claim 11. We hold that Zakoshansky claim 11 is obvious over the '181 certificate taken in light of the well known use of distillation recovery and recycle streams.

Hertzog's claim charts identify the '937 certificate as describing enhanced selectivity for AMS. Consideration of the '937 certificate with respect to Zakoshansky claim 11 is moot in light of our decision that Zakoshansky claim 11 is obvious over the '181 certificate.

Zakoshansky Claims 12-15

Zakoshansky claims 12 to 15 further limit the catalyst used in independent claim 11. Each of claims 12 to 15 require that the acidic catalyst be reacted with an amine.

Hertzog identifies all the limitations of claim 11 as present in the disclosure of the '181 certificate. (Paper No. 30, Appendix B). Hertzog identifies Zakoshansky's '030 certificate as describing an acidic catalyst that is the product of an amine and an acid and the '688 certificate as describing the reaction product as ammonium hydrogen sulfate. (*Id.*).

The '181 certificate explicitly states that:

The method makes possible simplification of the process through the use of the reaction product acetone instead of a NH_3 solution, and improvement of safety conditions through the elimination of the overneutralization of H_2SO_4 in case of overbatching of NH_3 .

(HX 1006a, p. 3).

Hertzog as moving party bears the burden of proving that it is entitled to the relief requested. Hertzog fails to explain why one skilled in the art would be motivated to add an amine to the method of the '181 certificate, especially where the '181 certificate describes the benefits (simplification, improved safety) that are achieved by avoiding the addition of an amine. Based upon the record presented, Hertzog fails to meet its burden of proving that Zakoshansky claims 12-15 are obvious over the prior art cited in Hertzog Preliminary Motions 1 and 2.

Zakoshansky Claims 16-20

Zakoshansky claim 16 is generally directed to a method comprising the decomposition of CHP in a non-isothermal manner and in the presence of an acidic catalyst and excess acetone. Claim 16 requires that the CHP decomposition products are sent to a separate vessel where DCP is decomposed in the presence of a reaction product of acid catalyst and an amine. The acetone from the DCP decomposition is recovered via distillation and recycled back to the CHP decomposition.

Zakoshansky claims 17-20 depend directly or indirectly on claim 16. Claims 17-19 further limit the reaction product of the acidic catalyst and the amine and claim 20 states that "the

reaction” is carried out at a temperature of from about 80 to 110° C.³¹

Hertzog identifies the ‘181 certificate as teaching all limitations of claim 16, with the exception of the DCP decomposition in the presence of the reaction product of an acidic catalyst and an amine. For a teaching of an amine reaction product, Hertzog identifies the ‘030 certificate. Additionally, Hertzog identifies the ‘135 certificate, as well as the ‘181 certificate, as describing a CHP decomposition conducted in a non-isothermal manner. (Paper No. 30, Appendix B).

As discussed above, the ‘181 certificate specifically describes a method that is said to be simplified and safer due to the use of excess acetone “instead of an NH₃ solution.” (HX 1006a, p. 3). Hertzog fails to provide credible evidence that one skilled in the art would be motivated to employ the amine reaction product of the ‘030 certificate in the excess acetone method of the ‘181 certificate or vice versa. Based upon the record presented, Hertzog fails to meet its burden of proof with respect to claim 16, and similarly with respect to dependent claims 17 to 20.

Zakoshansky Claims 22-26

Zakoshansky claim 22 is generally directed to a composition comprising cumene, an acidic catalyst, DCP, water, phenol, acetone and a reaction product of an amine and an acidic

³¹Claim 16 identifies three separate “reactions.” The decomposition of CHP, the decomposition of DCP and the reaction of an amine and an acidic catalyst are all “reactions.” The parties arguments regarding claim 20 assume that the term “the reaction” in claim 20 refers to the DCP decomposition process. (See Paper No. 30, Appendix B; Paper No. 52, Appendix 1). This interpretation appears consistent with Zakoshansky’s specification and we will analyze claim 20 using this construction.

catalyst. The acetone to phenol ratio ranges from 1.15:1 to 1.4:1. Zakoshansky claims 23 to 26 depend directly or indirectly upon claim 22 and further limit the acidic catalyst and the amine.

As discussed above, Hertzog Preliminary Motion 2 alleges that the same composition that is required by Zakoshansky claims 22-26 is described in Zakoshansky's '030 certificate. (Paper No. 31, p. 14). Hertzog's allegation that claims 22-26 are anticipated by the '030 certificate was denied on the basis that Hertzog failed to meet its burden that DCP is necessarily present in the decomposition mass of example 3 of the '030 certificate. Obviousness, unlike anticipation, may be established by demonstrating the existence of a suggestion to combine or modify prior art references, coupled with a reasonable expectation of success. *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000). Accordingly, we analyze whether or not there is a suggestion in the prior art to conduct the CHP decomposition process described by the '030 certificate such that DCP would be present in the decomposition mass and whether one of ordinary skill in the art would have a reasonable expectation of success for such a process.

Sifniades performs a CHP decomposition in two-stages. Sifniades first decomposes the CHP in the presence of an acidic catalyst and DMPC at a temperature of 50 to 90° C. (HX 1004, col. 2, lines 25-34). In decomposing the CHP, Sifniades states that "the present invention involves intentionally converting a substantial amount of the DMPC to DCP." (*Id.* at col. 2, lines 44-46). After the first stage CHP decomposition, Sifniades sends the decomposition mass through a cleanup reactor to reduce the level of residual CHP to no more than 0.4% and then the mixture is passed to a plug flow reactor where the DCP is converted at an elevated temperature to

AMS, phenol and acetone. (*Id.* at col. 2, lines 34-43). The two-stage CHP decomposition process is said to maximize AMS yield and reduced byproduct formation. (*Id.* at abstract, col. 2, lines 19-24 and Third Declaration of Mr. Fulmer, ZX 2030, ¶ 15).

Zakoshansky's expert, Mr. Fulmer, recognizes that:

DCP may also be formed during the acid catalyzed cleavage of CHP, and that DCP can decompose in the presence of an acidic catalyst to form phenol, acetone, and undesirable AMS dimers.

(ZX 2001, ¶ 46). As support for his position regarding the formation of DCP, Mr. Fulmer relied upon the teachings of Sifniades. (*Id.*). Mr. Fulmer testifies that "Sifniades' goal is to convert a portion of the DMPC to DCP in the first stage because DCP is relatively stable under conditions in the first stage and because Sifniades has a second stage to convert DCP back to DMPC." ZX 2030, ¶ 17).

The '030 certificate generally describes the decomposition of CHP by first employing a reactor circuit, taking the decomposition mass from the reactor circuit, add acetone and introduce the mass into a plug flow reactor where the plug flow reactor is at higher temperature than the reactor circuit. The method of the '030 certificate is said to stabilize the yield of the desired products. (HX 1007a, pp. 2-3). Sifniades generally teaches one of ordinary skill in the art to conduct the CHP decomposition in two-stages where DCP is intentionally formed in the first stage and then decomposed in a second stage plug flow reactor, where the plug flow reactor temperature is higher than the first stage reactor. (HX 1004, col. 2, lines 20-44). One of ordinary skill in the art would have been motivated to form DCP in the reactor circuit of the '030 certificate and then decompose the DCP in the plug flow reactor of the '030 certificate in order to

achieve the increased AMS yield and reduced byproduct formation as taught by Sifniades.

Further, while we do not credit Mr. Levy's testimony that DCP will necessarily be present in the '030 reactor circuit effluent, we credit Mr. Levy's testimony that one of ordinary skill in the art would expect DCP to be formed in the '030 reactor circuit in significant quantities and be present in the reactor circuit effluent. Based upon the evidence presented, we conclude that the '030 certificate, taken in light of the prior art, suggests conducting a two-stage CHP decomposition process where the first stage forms DCP and the second stage decomposes CHP and that there existed a reasonable expectation of success for conducting such a process to arrive at a first stage decomposition mass having the required components recited in Zakoshansky claims 22-26. We grant that portion of Hertzog Preliminary Motion 2 that requests that Zakoshansky claims 22-26 be held obvious over the prior art.

Zakoshansky Claims 27 and 29

Zakoshansky claim 27 is directed to an improved method for preparing phenol and acetone from an acid catalyzed CHP decomposition. The improvement is said to comprise decomposing the CHP in the presence of 10 to 18 wt% cumene "at a specific acidic catalyst concentration and temperature" whereby phenol, acetone and DCP are formed. The DCP is then transferred to a plug flow reaction where the DCP is decomposed to phenol, acetone and AMS in a weaker acidic acid catalyst medium and higher temperature than the CHP decomposition reaction. The DCP decomposition is said to be "better controlled." Zakoshansky claim 29 depends from claim 27 and states that at least a portion of the lowered acid concentration is

accomplished through the addition of an amine.

Dr. Zakoshansky's Reissue Declaration states that:

Issued Claims 27 and 29 omitted a limitation to the preferred embodiment of my method which uses excess cumene in an amount of about 10 to 18 weight percent of the reactor composition. Without this limitation, issued Claims 27 and 29 read on the disclosures of each of my Author Certificates 1,391,030, 1,699,135 and 1,361,937. Example 2 of my Author Certificate 1,361,937, for example, discloses a reaction providing better control wherein cumene hydroperoxide is decomposed at a specific acidic catalyst concentration and temperature whereby a composition comprising phenol, acetone and dicumyl peroxide is formed, and the reaction mass containing the dicumyl peroxide is transferred to a plug flow reactor wherein decomposition of the dicumyl peroxide to phenol, acetone and alphas-methylstyrene occurs in a weaker acidic catalyst medium and a higher temperature than the CHP decomposition catalyst concentration and temperature. Example 2 also discloses the addition of ammonia, as called for by issued Claim 29. Therefore, I believe that Example 2 of my Author Certificate 1,361,937 discloses a process described by issued Claims 27 and 29.

This error is corrected by amending independent Claim 27 to require the decomposition of CHP in the presence of excess cumene in an amount of about 10 to 18 weight percent of the reactor composition.

(HX 1011, ¶¶ 32-33).

The method of the '937 certificate is not limited to a particular amount of cumene.

Specifically, the abstract and the sole claim of the '937 certificate merely state that the method employs "technical cumene hydroperoxide." The '937 does exemplify a technical CHP composition containing 1.2 wt% cumene but the certificate does not identify the technical CHP as limited to this particular quantity of cumene.

Sifniades describes the use of a technical CHP composition having 13 wt% cumene.

(Paper No. 30, ¶ 122 and Appendix B). The parties dispute whether or not it would have been

obvious for one skilled in the art to employ the technical CHP of Sifniades, with its 13 wt% cumene, as the technical CHP of the '937 certificate.

For the reasons provided above with respect to the obviousness of Zakoshansky claim 1, we credit Dr. Levy's testimony that one skilled in the art desiring a more controllable reaction would employ the technical CHP of Sifniades, which contains 13 wt% cumene, as the technical CHP in the CHP decomposition method described in Zakoshansky's '937 certificate. Based upon the evidence presented, we conclude that Zakoshansky claims 27 and 29 are obvious over the '937 certificate taken in light of the teachings of the Sifniades patent.

Hertzog's claim charts identify the '030 and '181 certificates as pertinent to the issue of obviousness for Zakoshansky claims 27 and 29, respectively. Consideration of the '030 and '181 certificates with respect to Zakoshansky claims 27 and 29 is moot in light of our decision that Zakoshansky claims 27 and 29 are obvious over the '937 certificate.

Zakoshansky Claim 28

Zakoshansky claim 28 is directed to a method for preparing phenol and acetone from the decomposition of CHP with an acidic catalyst. The method of claim 28 decomposes the CHP to form phenol, acetone and DCP and transfers the DCP to a plug flow reactor where the DCP is decomposed to phenol, acetone and AMS. The DCP decomposition occurs in a weaker acidic catalyst than the CHP decomposition. The temperature of the CHP decomposition ranges from about 70 to 90° C. and the temperature of the DCP decomposition ranges from about 80 to 110° C. with the temperature of the DCP decomposition being higher than the CHP decomposition.

The catalyst concentration in the CHP decomposition is from about 50 to 750 ppm of the decomposition mass and the catalyst is lowered by about 10 to 99 mole % for the DCP decomposition.

Hertzog identifies various portions of Zakoshansky claim 28 as described in the '181 certificate, the '030 certificate and the '937 certificate. (Paper No. 30, Appendix B). In particular, Hertzog identifies the '181 certificate as describing the decomposition of the CHP at a specific acid catalyst concentration. Hertzog identifies the '030 certificate as teaching the decomposition of the CHP at a temperature ranging from about 40 to 70° C. and exemplifying 70° C. Hertzog also identifies the '030 certificate as describing the DCP decomposition temperature as ranging from 80 to 100° C. and as teaching the addition of an amine to the CHP decomposition to neutralize the acidic catalyst. Hertzog directs our attention to the '937 certificate for the description of using a weaker acidic catalyst medium in the DCP plug flow decomposition reactor. (*Id.*). Hertzog argues that one of ordinary skill in the art was motivated to combine the disclosures of Zakoshansky's certificates and Sifniades and arrive at Zakoshansky's claimed invention. (Paper No. 30, p. 25, HX 1024, ¶ 77).

Hertzog identifies the lowering of the acid catalyst of Zakoshansky claim 28 as including the "neutralization with 20% by mass acetone." (*Id.*). Zakoshansky takes the position that the use of excess acetone "does not neutralize the acid." (Paper No. 52, Appendix A).

Hertzog fails to provide credible evidence that the lowered catalyst mole percent of claim 28 encompasses the addition of acetone to the DCP reactor. In contrast, Zakoshansky's construction of the lowered catalyst terminology is consistent with description in Zakoshansky's

specification. Specifically, regarding the reduced acid catalyst in the DCP plug flow reactor,

Zakoshansky's specification teaches that:

Generally, the ammonia is added as aqueous ammonia of relatively low concentration, from about 0.15 to 10 wt% ammonia. Generally about 10 to 99 wt. % of the original acid catalyst is neutralized, preferably the quantity of catalyst neutralized is from about 30 to about 70 wt %.

(HX 1017, col. 6, lines 5-10).

We construe claims with their broadest reasonable interpretation. *In re Morris*, 127 F.3d at 1054-55, 44 USPQ2d at 1027. Based upon the evidence presented, we conclude that the broadest reasonable interpretation of the lowered catalyst mole percent of claim 28 refers to neutralization of the acidic catalyst.

We have considered the prior art cited by Hertzog regarding Zakoshansky claim 28 but are not persuaded that one skilled in the art was motivated to combine the certificates to arrive at the subject matter claimed by Zakoshansky. For example, the '030 certificate is relied upon by Hertzog for lowering of the acidic catalyst in the DCP decomposition plug flow reactor as compared to the CHP decomposition reactor. Yet, the '030 certificate partially neutralizes the acidic catalyst prior to entering the CHP decomposition reactor and adds excess acetone, and not ammonia, prior to the entry into the DCP reactor.

We agree with Hertzog that the '937 teaches the use of a weaker acidic catalyst medium for the DCP reactor through the addition of ammonia to the CHP decomposition product prior to its entry into the DCP reactor. The '937 certificate however, employs a CHP decomposition temperature of from 35 to 65° C. as opposed to the claimed 70 to 90° C. While Sifniades teaches a CHP decomposition temperature of 50 to about 90° C. and the '030 certificate teaches 40 to 70°

C., Hertzog fails to provide credible evidence that one skilled in the art would have been motivated to combine the particularly identified parameters and arrive at the subject matter of Zakoshansky claim 28. Hertzog's and Dr. Levy's contention that the chemistry and the processes of the certificates and Sifniades are similar is insufficient motivation to vary the particular parameters to arrive at the claimed subject matter. *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1680-81 (Fed. Cir. 1988) (Obvious to try various parameters where no indication or direction as to which ones are likely to be successful is not obviousness).

Zakoshansky Claims 30 and 31

Zakoshansky claim 30 is generally directed to a CHP decomposition process where the CHP is decomposed in a multiplicity of separate sequential reactors each having a controlled temperature range. A portion of the CHP decomposition product is sent to a plug flow reactor of smaller size than the CHP reactors and the delta T° C. of the inlet and outlet of the plug flow reactor is from about 4 to 16° C. The smaller size reactor decomposes essentially all of the remaining CHP and provides an analytical indication of the completeness of the CHP reaction and the reactors are thereby controlled. Zakoshansky claim 31 depends upon claim 30 and limits the delta T° C. to about 5 to 15° C.

As discussed above with respect to Zakoshansky claim 6, the '135 certificate describes CHP decomposition process where CHP is decomposed in a main reactor and sent to two cooling stages from which the CHP decomposition products are sent to an intermediate tank and then onto a plug-flow reactor (DCP reactor). The '135 certificate describes a temperature differential

for the inlet and outlet of the intermediate tank that falls within the claimed temperature ranges. Yet, for the reasons provided above with respect to Zakoshansky claim 6, we hold that Hertzog fails to provide credible evidence that one skilled in the art would employ a delta T° C. of from about 4 to 16° C. for the inlet and outlet of the plug flow reactor where the plug flow reactor provides an analytical indication of the completeness of the CHP decomposition reaction.

Additionally, we note that Hertzog's claim charts cite the '181 certificate as describing a CHP decomposition using a multiplicity of separate reactors each with a controlled temperature range. Hertzog's claim charts do not identify where the '181 certificate describes the delta T° C. that are recited in Zakoshansky claims 30 and 31.

Zakoshansky Claim 33

Zakoshansky claim 33 is said to be an improved method of CHP decomposition wherein the improvement comprises: 1) recycling the CHP decomposition products to a CHP feedstream in an amount of from 10 to 25 times the weight of the CHP feedstream, and 2) adding excess acetone such that the molar ratio of acetone to phenol in the CHP decomposition reaction is 1.1:1 to 1.5:1.

Hertzog identifies the '181 certificate as describing the use of excess acetone in a CHP decomposition process. (Paper No. 30, Appendix B). Hertzog identifies the '937 certificate as describing the recycle of CHP decomposition products to a CHP feedstream and provides the following testimony of Dr. Levy regarding the '937 recirculation stream:

The CHP feed is mixed with the recirculating reaction mass before entering the first decomposer, with ratios (circulation reaction mass to CHP feed) disclosed

ranging from 6:1 to 20:1, with 8:1 to 16:1 providing the best results. Ex 1008A, p. 3, ¶¶4, 7; p. 8, ¶¶1, 3; p. 9, Table, col. 3. (Such a circulation loop is depicted in the schematic diagram of the '135 Certificate, which shows the technical CHP feed entering the circulation loop between the acid addition step and the first decomposer reactor. See Ex. 1005A, p. 135.10, Figure.). As described above, it was well known that technical CHP is extremely reactive when mixed with the acidified reaction mass, so one skilled in the art would know that it was an inherent requirement that the two streams be thoroughly mixed together with static mixers or liquid eductors. Therefore, one skilled in the art would understand that the '937 Certificate (and the '135 Certificate) disclose that prior to entering the first decomposer reactor, the CHP feed is thoroughly mixed with the circulating reaction mass of phenol, acetone, acid, water and ammonia, and only then is the mixed stream fed into the first sequential decomposer reactor.

(Paper No. 30, Appendix B; HX 1024, ¶ 29).

Zakoshansky argues that the '181 and '937 certificates are directed to different processes than that of Zakoshansky claim 33. (Paper No. 52, Appendix 1). Zakoshansky, and its expert, Mr. Fulmer, point out that the '937 certificate does not employ excess acetone and that the '181 certificate teaches adding excess acetone to both the CHP decomposition reactor *and* to the DCP decomposition reactor. Zakoshansky claim 33 is written with the "comprises" transition phrase. The "comprises" transition opens a claim to the inclusion of additional unrecited steps, such as the addition of excess acetone to a DCP plug-flow reactor.

Additionally, while Zakoshansky agrees that the '181 certificate exemplifies a 1.42:1 excess acetone to phenol ratio, Zakoshansky argues that "[i]t does not disclose the claimed range of acetone to phenol ratios." (*Id.*). As stated above, the description in the prior art of a value within a claimed range is an anticipation of the range. *In re Wertheim*, 541 F.2d 257, 267, 191 USPQ 90, 100 (CCPA 1976). The '181 certificate specifically teaches that a 1.42:1 molar ratio of excess acetone to phenol is effective for a CHP decomposition process and this ratio falls

within Zakoshansky's claimed 1:1 to 1.5:1 range.

The '937 certificate describes a CHP decomposition process in the presence of sulfuric acid and NH_3 . (HX 1008a, Abstract). Zakoshansky is correct that the '937 certificate does not teach the use of excess acetone whereas the '181 certificate does. The '181 certificate teaches that the use of excess acetone instead of NH_3 simplifies the CHP decomposition process and improves safety and exemplifies a 1.42:1 molar ratio of acetone to phenol. One skilled in the art reading the '181 and '937 certificates would be motivated to replace the NH_3 of the '937 certificate and employ a 1.42:1 molar ratio of acetone to phenol in order to obtain a simplified and safer CHP decomposition process. Based upon the evidence presented, we conclude that Zakoshansky claim 33 is unpatentable as obvious over the prior art cited in Hertzog Preliminary Motion 1.

Zakoshansky Claims 34 to 36

Zakoshansky claims 34 to 36 depend from claim 33 and require the addition of water to the CHP decomposition products. Zakoshansky claim 34 requires that water be added in an amount not to exceed 3 wt. %, claim 35 is not to exceed 2 wt. % and claim 36 is not to exceed 1.5 wt. %.

Hertzog identifies Sifniades as teaching the desirability of adding water to the first-stage reactor in an amount of from 0.4% to 4.5%, preferably from 0.8 to 1.5% water by weight of the reaction mixture. (Paper No. 30, ¶ 118). Dr. Levy, a Hertzog expert, testifies that this addition is to "adjust the amount of residual CHP in the reaction mixture to its optimum amount." (HX

1024, ¶ 73). Zakoshansky's expert, Mr. Fulmer, also identifies Sifniades as describing the desirability of water and directs our attention to Sifniades Examples 10 and 11, which add 0.5% and 1.0% water. (ZX 2001, ¶ 57).^{32, 33}

We credit the testimony of both Dr. Levy and Mr. Fulmer and conclude that Sifniades teaches the desirability of adding water to the CHP decomposition products and that Sifniades specifically suggests the addition of 0.5 and 1.0 wt. % water. We further conclude that the one skilled in the art, having employed the excess acetone of the '181 certificate in place of the NH₃ solution in the '937 certificate, would have been motivated to add water in the amount of 0.5 or 1.0 wt. % given Sifniades' teaching of its desirability. Based upon the evidence presented, we conclude that Zakoshansky claims 34 to 36 are unpatentable as obvious over the prior art cited in Hertzog Preliminary Motion 1.

Hertzog's claim charts identify the '030 certificate as teaching the desirability of adding water to the CHP decomposition products. Consideration of the '030 certificate with respect to Zakoshansky claims 34 to 36 is moot in light of our decision that Zakoshansky claims 34 to 36 are obvious over the '181 and '937 certificates taken in light of Sifniades.

³²Mr. Fulmer's testimony regarding the addition of water in Sifniades was relied upon by Zakoshansky in Zakoshansky Preliminary Motion 3 to demonstrate the unpatentability of Hertzog claims 34 and 35, which also require the addition of water to the CHP decomposition products.

³³While Hertzog's claim charts do not rely upon Sifniades for teaching the addition of water, we rely upon Sifniades in light of Hertzog's identification of Sifniades in the fact section of Hertzog Preliminary Motion 1 (Paper No. 30, ¶ 118) and Mr. Fulmer's specific testimony regarding Sifniades' addition of water to the CHP decomposition process.

Zakoshansky Claim 37

Zakoshansky claim 37 is directed to an improved method for enhancing the decomposition of CHP where the improvement is said to comprise: 1) decomposing the CHP in a non-isothermal manner, 2) the presence of 10 to 18 wt. % cumene, and 3) introducing additional water into the CHP decomposition reactor.

Hertzog cites the '135 and '030 certificates as describing the introduction of water into a technical CHP decomposition reactor. (Paper No. 30, Appendix B). Hertzog relies upon Sifniades as demonstrating that technical CHP for a CHP decomposition reaction may contain 13 wt. % cumene.

Zakoshansky attempts to distinguish the '135 and '030 certificates by arguing that they are directed to a different process than that of claim 37. Zakoshansky states that the '135 certificate teaches the addition of "aqueous ammonia to both stages of the process and does not use any excess acetone." (Paper No. 52, Appendix 1). Zakoshansky argues that the '030 certificate differs as it describes a process that "adds aqueous ammonia only to the first stage of the process and excess acetone only to the second stage." (*Id.*).

Zakoshansky claim 37 only recites one "stage" and does not mention the addition of acetone or aqueous ammonia. Zakoshansky claim 37 is written with the "comprises" transition language. As previously discussed, the "comprises" transition language opens the claim to the inclusion of additional unrecited steps, such as a second "stage" DCP decomposition and/or addition of aqueous ammonia to the first "stage."

The '135 certificate describes a process for controlling the CHP decomposition reaction to increase the yield of desired products. (HX 1005a, p. 2, lines 3-5). The '135 certificate describes passing a technical grade CHP into a main reactor and then onto a first and second cooling stage. (*Id.* at p. 4, lines 7-14). The '135 certificate describes supplying water to the main reactor.

Zakoshansky's expert, Mr. Fulmer, testifies that the main reactor of the '135 certificate is not a "non-isothermal" process as that term is used by Zakoshansky. (ZX 2023, ¶ 104). Mr. Fulmer does not discuss the first and second cooling stages.

Dr. Levy testifies that approximately 95% of the CHP decomposition product leaving the second cooling stage is recycled back to the main reactor and will constitute 95% of the mass entering the main reactor. (HX 1024, ¶ 43). Dr. Levy concludes that the temperature of the inlet of the main reactor will be approximately that of the outlet of the second cooling stage reactor. (*Id.*). Further, Dr. Levy testifies that one skilled in the art would understand that the reaction mass of the '135 certificate has a non-isothermal temperature gradient, with a high point at the outlet of the main reactor and decreasing through the two subsequent cooling stages. (HX 1024, ¶ 43).

Regarding the non-isothermal nature of the '135 certificate, we credit the testimony of Dr. Levy and not that of Mr. Fulmer. In particular, we find Dr. Levy's explanation of the CHP decomposition mass as it passes through the main reactor and the first and second cooling stages of the '135 certificate to be credible in contrast to Mr. Fulmer's testimony that focuses solely on the main reactor while not specifically addressing the effects of recirculating the product of the

second cooling stage.

Based upon the evidence of record, we conclude that the '135 certificate suggests a non-isothermal process for the decomposition of technical CHP where water is added to the CHP decomposition reactor. The '135 certificate however, does not specifically define the technical grade CHP that is used in the decomposition reaction. As discussed above, Sifniades describes and exemplifies the use of technical grade CHP having about 13 wt. % cumene for a non-isothermal CHP decomposition process where 0.5 or 1.0 wt. % water is added. (HX 1004, Examples 10 and 11). One skilled in the art reading the '135 certificate and its non-isothermal technical grade CHP decomposition process where water is added to the main reactor, would have been motivated to employ the technical grade CHP of Sifniades, with its 13% cumene, as Sifniades specifically exemplifies this CHP composition as a suitable starting material for the CHP decomposition process. Further, as discussed above, we credit Dr. Levy's testimony that employing a reduced amount of CHP, *e.g.*, a composition having 13 wt. % cumene as opposed to 1.2 wt. % cumene, will provide a more controllable reaction as the CHP will be more dilute and decompose at a slower rate. We conclude that the subject matter of Zakoshansky claim 37 is obvious over the combined teachings of the '135 certificate and Sifniades. As we have determined that Zakoshansky claim 37 is obvious over the combination of the '135 certificate and Sifniades, we do not reach the question of whether it is also obvious over the teachings of the '030 certificate and Sifniades.³⁴

³⁴Hertzog Preliminary Motion 1 alleges that Sifniades anticipates Zakoshansky claim 37. (Paper No. 30, p. 24). This issue is moot in light of our determination that the '135 certificate in light of Sifniades render Zakoshansky claim 37 obvious. We note however that Hertzog

Zakoshansky Claim 38

Zakoshansky claim 38 is directed to a CHP decomposition mass produced by a continuous non-isothermal reaction of CHP in the presence of a sulfuric acid catalyst. The reaction employs an acetone to phenol ratio of about 1.1:1 to 1.5:1 and cumene in an amount of about 10 to 18 wt. %.

For the reasons provided above with respect to Zakoshansky claim 1, we hold that Zakoshansky claim 38 is obvious over the '181 certificate read in light of the teachings of Sifniades. Specifically, the '181 certificate teaches a continuous, non-isothermal CHP decomposition process that employs a sulfuric acid catalyst and an excess of acetone where the ratio of acetone to phenol is 1.42 and it would have been obvious to one skilled in the art to employ the technical CHP of Sifniades, which has about 13 wt. % cumene, as the technical CHP of the '181 certificate. One of ordinary skill in the art would understand that the process of the '181 certificate with the technical CHP of Sifniades would lead to the composition required by Zakoshansky claim 38. Specifically, we credit the testimony of Mr. Levy that the use of technical CHP with a higher percentage of cumene, such as that described by Sifniades, is at best a minor variation from the process described in the '181 certificate. (HX 1024, ¶ 67). We hold that Zakoshansky claim 38 is obvious over the '181 certificate taken in light of the teachings of Sifniades.

Preliminary Motion 1 does not contain a claim chart identifying where each element of Zakoshansky claim 37 is described in Sifniades.

Hertzog's claim charts identify the '135, '030, and '937 certificates as teaching certain components required by Zakoshansky claim 38. Consideration of the '135, '030 and '937 certificates with respect to Zakoshansky claim 38 is moot in light of our decision that Zakoshansky claim 38 is obvious over the '181 certificate in light of Sifniades.

Zakoshansky Claim 40

Zakoshansky claim 40 is generally directed to an improved method for decomposing DCP into AMS, phenol and acetone. The claimed process begins by decomposing CHP in the presence of an acidic catalyst and excess acetone to form phenol, acetone and DCP. In a separate vessel the DCP is decomposed at a temperature of from 80° C. to 110° C. in the presence of an acidic catalyst. The DCP decomposition products are then sent to another vessel where the acetone is allowed to evaporate and at least a portion of the acetone is then recycled to the CHP decomposition reaction where it is thoroughly mixed with the CHP feed prior to entering the CHP reactor.

Hertzog identifies the '181 certificate as teaching or suggesting the subject matter presented in Zakoshansky claim 40. (Paper No. 32, Appendix B). As discussed above with respect to Zakoshansky claim 11, the '181 certificate teaches a CHP decomposition process where the CHP is decomposed in sequential reactors and the products are sent to a secondary plug-flow reactor (DCP decomposition reactor). (HX 1006a, pp. 2-3). The CHP decomposition is conducted in the presence of excess acetone and a sulfuric acid catalyst. (*Id.*). The DCP decomposition reactor is maintained at a temperature ranging from 85 to 105° C. (HX 1006a,

Claims). While the '181 certificate does not explicitly teach Zakoshansky's claimed acetone recovery and recycle, we credit the testimony of Zakoshansky's own expert, Mr. Fulmer, that the "suitable and obvious means for obtaining acetone" would be to use evaporation recovery and recycle. (ZX 2001, ¶¶ 110, 113).

Zakoshansky argues that the '181 certificate is directed to a different process than that of Zakoshansky claim 40. Zakoshansky alleges that the '181 certificate adds excess acetone to both the first and second stages whereas claim 40 requires excess acetone be added only to the first. (Paper No. 52, Appendix 1, ZX 2023, ¶ 130). Zakoshansky claim 40 is written with the "comprises" transition and does not exclude the addition of acetone to a second stage reactor.

The parties dispute whether or not it would have been obvious to one of ordinary skill in the art to thoroughly mix the acetone stream with the technical CHP feedstream prior to entering the CHP reactor. Zakoshansky's expert, Mr. Fulmer, testifies that the '181 certificate "does not disclose the step of thoroughly mixing excess acetone with the CHP feedstream." (HX 2023, ¶ 130). Regarding the mixing of a CHP feedstream, Dr. Levy, a Hertzog expert, testified under cross-examination that it is:

[W]ell understood by anyone running a phenol plant that you have to have mixing otherwise you run the risk of uncontrollable reactions. And it was understood in the art at that time you had to have proper mixes of that entrance speed stream.

(Levy Transcript, HX 1034, p. 53, line 18 to p. 54, line 4 and see also, p. 54, lines 5-16, p. 84, line 11 to p. 85, line 23, and p. 186, lines 6 to 22). While we agree with Mr. Fulmer that the '181 certificate does not explicitly teach thoroughly mixing acetone with a CHP feedstream, we credit Dr. Levy's cross-examination testimony that one skilled in the art would be motivated to

thoroughly mix the streams to control the CHP reaction and to ensure proper mixes of the entrance stream speed.

Hertzog has demonstrated that one skilled in the art presented with the '181 certificate would have been motivated to arrive at the subject matter of Zakoshansky claim 40. We grant Hertzog Preliminary Motion 1 with respect to Zakoshansky claim 40.

Hertzog's claim charts identify the '937 certificate as describing the presence of an acidic catalyst whereby the selectivity for AMS is enhanced. Consideration of this particular teaching in the '937 certificate is moot in light of our decision holding Zakoshansky claim 40 obvious over the '181 certificate.

Zakoshansky Claim 41

Zakoshansky Claim 41 is generally directed to a method for the efficient generation of recycle acetone "comprising" decomposing DCP and feeding at least a portion of the DCP decomposition products to a separate vessel where the acetone is allowed to evaporate and sending at least a portion of the evaporated acetone to a CHP decomposition reactor where the acetone is thoroughly mixed with the CHP feedstream prior to entering the reactor.

Hertzog identifies the '181 certificate as teaching or suggesting all the material limitations of Zakoshansky claim 41. Zakoshansky argues that the '181 certificate requires addition of excess acetone to a first and second stage, does not disclose a recycle acetone stream or the thorough mixing of the acetone recycle and the CHP feedstream prior to entering the CHP reactor. The parties arguments and evidence have been considered and for the reasons presented

above with respect to Hertzog claim 40, we conclude that one skilled in the art reading the '181 certificate would have been motivated to arrive at the subject matter of Zakoshansky claim 41. Hertzog Preliminary Motion 1 is granted with respect to Zakoshansky claim 41.

Hertzog's claim charts identify the '937 certificate as describing the presence of an acidic catalyst whereby the selectivity for AMS is enhanced. Consideration of this particular teaching in the '937 certificate is moot in light of our decision holding Zakoshansky claim 41 obvious over the '181 certificate.

Summary of Zakoshansky's Claims with Respect to Hertzog Preliminary Motions 1 and 2

Hertzog, as the moving party, bore the burden of proving that it was entitled to the relief requested in Hertzog Preliminary Motions 1 and 2. Based upon the evidence identified, we conclude that Hertzog has met its burden with respect to the anticipation of Zakoshansky claims 2, 4, and 7-9 and the obviousness of Zakoshansky claims 1, 2, 4, 7-9, 11, 22-27, 29, 33-38 and 40-41. Hertzog has not met its burden of proof with respect to Zakoshansky claims 3, 5, 6, 10, 12-20, 28, 30 and 31. Accordingly, Hertzog Preliminary Motions 1 and 2 are *granted* with respect to Zakoshansky claims 1, 2, 4, 7-9, 11, 22-27, 29, 33-38 and 40-41 and *denied* with respect to Zakoshansky claims 3, 5, 6, 10, 12-20, 28, 30 and 31. Further, we hold that Hertzog Preliminary Motion 1 is *moot* with respect to Zakoshansky claims 21 and 39 as we have already held these claims unpatentable as Zakoshansky did not attempt to distinguish the subject matter of claims 21 and 39 over the teachings of Sifniades and Messina.

E. Hertzog Preliminary Motion 3: Request that Zakoshansky's Claims Be Held Unpatentable Under 35 U.S.C. § 112, 1st para., Best Mode

Hertzog requests that all of Zakoshansky's involved claims be held unpatentable due to an alleged failure to disclose in the specification the best mode of carrying out the claimed invention. (Hertzog Preliminary Motion 3, Paper No. 32). Zakoshansky opposes. (Zakoshansky Opposition 3, Paper No. 54).

Zakoshansky's claims include various recitations to "an improved method" where the improvement relates to better control of the reaction, higher selectivity for the desired products, and enhanced safety. (Paper No. 32, ¶¶ 7-14). According to Hertzog, Zakoshansky's specification discloses two alleged improvements to the basic process for making phenol, acetone and AMS from a two-stage CHP decomposition process. Hertzog states that these alleged improvements relate to the yield and specificity of the CHP decomposition reaction and to the selectivity of the DCP decomposition. (*Id.* at ¶¶ 18-21). Hertzog states that Zakoshansky's specification fails to provide guidance as to how to control various "important" parameters to optimize for selectivity and safety. (*Id.* at ¶¶ 42-48).

According to Hertzog, Zakoshansky's involved specification and claims are directed to the same process as that disclosed in the '135 certificate with the addition of the improvement of using excess acetone. (Paper No. 32, ¶¶ 99, 103). Hertzog states that a computerized control system was described in Zakoshansky's '135 certificate but that this computerized control was not included in Zakoshansky's involved specification. (*Id.* at ¶¶ 110-114 and p. 20).

Hertzog directs our attention to a letter written by Dr. Zakoshansky dated September 18, 2002 that is addressed to "colleagues and customers." (HX 1015). The letter states that ILLA

International, which lists Dr. Zakoshansky as its president, licenses only a particular “three-level protection system” that enables the CHP cleavage process to prevent automatically the effects of certain factors and allows an AMS yield of more than 90 mole%. (HX 1015, p. 1). The letter further states that a flexible computer system is employed at process startup under a “specially created procedure.” (*Id.*). According to the letter, the “ten-year operation of this protection system at GE and other plants has clearly confirmed its superiority over traditional single-level system[s].” (*Id.* at p. 2).

Hertzog also directs our attention to several ILLA articles concerning the CHP decomposition process and the need for computerized control for safety reasons. (HX 1016 and 1018, Paper No. 32, ¶¶ 55-74). The articles appear to have been printed out on October 1, 2002 (HX 1016) and October 8, 2002 (HX 1018).

1. Case Law Regarding Best Mode

The Federal Circuit’s opinion in *Bayer AG v. Schein Pharmaceuticals Inc.*³⁵ provides a history of the best mode requirement. As noted by Hertzog (Paper No. 32, p. 20), Bayer states that:

The general contours of our test for compliance with the best mode requirement are well known: Compliance with best mode is a question of fact composed of two subsidiary factual inquiries. First, the factfinder must determine whether, at the time of filing the application, the inventor possessed a best mode for practicing the invention. The first prong, we have explained, is highly subjective and focuses on the inventor’s state of mind as of the date of filing the application. Second, if the inventor subjectively considered one mode to be preferred over all

³⁵301 F.3d 1306, 64 USPQ2d 1001 (Fed. Cir. 2002).

others, then the second inquiry is whether the inventor's disclosure is adequate to enable one of ordinary skill in the art to practice the best mode of the invention. This inquiry is objective and depends upon the scope of the claimed invention and the level of skill in the relevant art. [citations omitted].

301 F.3d at 1320, 64 USPQ2d at 1010-11.

Of note, the *Bayer* opinion cites *DeGeorge v. Bernier*³⁶ as "one of the key cases for understanding the best mode requirement." *Id.* at 1320, 64 USPQ at 1010. *DeGeorge* involved an appeal from a decision of the Board of Patent Appeals and Interferences that, among other things, construed a count as requiring both an electrical circuit and a word processor, and determined that DeGeorge's specification failed to provide a "best mode" for a word processor to be used with the circuit. The Federal Circuit reversed the Board's decision on best mode stating that the properly construed count did not include a word processor, and thus the absence of information in DeGeorge's specification regarding a word processor did not run afoul of the best mode requirement. *Id.* at 1325, 226 USPQ at 763.

2. Zakoshansky's Involved Claims Do Not Require a Computer System

As discussed in *Bayer*, the starting point of the analysis is the scope of the claimed subject matter. *Bayer*, 301 F.3d at 1320, 64 USPQ2d at 1011 (Inquiry begins by determining identity of the claimed invention). Hertzog is correct that many of Zakoshansky's involved claims refer to improved processes whereby the CHP process is more controllable, more selective, selectivity is enhanced, and safety is improved. Hertzog fails however, to demonstrate

³⁶768 F.2d 1318, 226 USPQ 758 (Fed. Cir. 1985).

that the broadest reasonable interpretation of Zakoshansky's claims includes a requirement that a computer system be used in combination with any of Zakoshansky's claimed processes and compositions. Indeed, Hertzog Preliminary Motions 1 and 2 allege that Zakoshansky's claims are unpatentable over prior art, but the motions do not specifically identify whether or where a computer is described or suggested for each of the claims alleged to be unpatentable. Providing Zakoshansky's claims with their broadest reasonable interpretation, we construe the claims as encompassing, but not requiring, the use of a computer control. Thus, as with the Federal Circuit's decisions in *Bayer* and *DeGeorge*, we hold that Zakoshansky was not required to describe a computer control system as the subject matter claimed does not require such a system.

3. A Computer System Is Not Required To Practice Zakoshansky's Claimed Subject Matter

Zakoshansky's claims encompass CHP decomposition compositions and processes. In alleging a lack of best mode, Hertzog contends that Dr. Zakoshansky believes that a computer control system is "a necessary and superior mode for carrying out his invention." (Paper No. 32, p. 21). Hertzog directs our attention to an article authored by Dr. Zakoshansky in which Dr. Zakoshansky states:

With no immediate and efficient control over CHP conversion, the two-step mild process can never succeed for safety reasons.

(HX 1016, p. 2, para. 3, emphasis in original).

Zakoshansky's comment regarding the need for immediate and efficient control in a two-step mild process refers to an industrial scale process. For example, Dr. Zakoshansky goes on to

state that the control issue was first resolved at a phenol plant in Russia. (*Id.* at para. 4).

Zakoshansky's claims do not require an industrial scale process. While the claimed process is open to use on an industrial scale, the claims do not positively recite such a limitation nor is there a sufficient basis to read such a limitation into the claims.

Based upon the record presented, Hertzog fails to provide sufficient evidence to demonstrate that a computer control system is required to perform Zakoshansky's claimed processes or necessary to make Zakoshansky's claimed compositions.

4. Hertzog Fails to Provide Sufficient Evidence That Zakoshansky Possessed A Best Mode at the Time of Filing the Involved '092 Application

Hertzog alleges that Zakoshansky's certificates establish that Zakoshansky contemplated a computer as the best mode for carrying out the claimed invention. (Paper No. 32, pp. 20-21). According to Hertzog, the process disclosed in Zakoshansky U.S. Specification consists of the disclosure of the '135 certificate with the improvements disclosed in the '181 certificate. (*Id.* at ¶ 103). Hertzog argues that since the '135 certificate identifies a computer control system for a CHP decomposition process, Dr. Zakoshansky considered this the best mode for such processes. (*Id.* at pp. 20-21).

Hertzog contends that the differences between the '135 certificate and Zakoshansky's claimed subject matter are "immaterial." (Paper No. 81, pp. 1-2). As discussed above with respect to Hertzog Preliminary Motions 1 and 2, Hertzog has failed to demonstrate that the '135 certificate anticipates Zakoshansky's claimed subject matter. In particular, we do not find the differences "immaterial" such that the involved Zakoshansky claims are anticipated by the

subject matter of the '135 certificate.

Best mode focuses on the inventor's state of mind. The fact that certain variations to the '135 certificate may be considered "obvious" does not provide sufficient evidence that Dr. Zakoshansky possessed a particular best mode for carrying out the "obvious" combination of subject matter, *e.g.*, the '135 certificate combined with the alleged improvements of the '181 certificate.

Hertzog directs our attention to several statements made by Dr. Zakoshansky, in a letter written in September 18, 2002 (HX 1015) and in an article concerning the CHP decomposition process (HX 1016). Both the letter and the article indicate that a computer system is the preferred manner of operating an industrial scale CHP decomposition process. The 2002 letter identifies a "ILLA three-level protection system" that has been in operation at a GE plant for ten years. (HX 1015, p. 2). The Zakoshansky article (HX 1016) identifies a simple rule that a two-step mild process can never succeed for safety reasons without immediate and efficient control over the CHP conversion, and goes on to state that CHP conversion control issues were first resolved at a phenol plant in Russia, and provides a footnote that cites, among other things, Zakoshansky's '571 patent, which is the underlying basis for Zakoshansky's involved reissue application. (HX 1016, p. 2).

A moving party bears the burden of proof to establish that it is entitled to the relief requested and this burden is by a preponderance of the evidence. 37 C.F.R. § 1.637(a)³⁷. Hertzog does not rely upon the direct testimony of Dr. Zakoshansky as to his subjective beliefs as of the

³⁷See new rule 37 C.F.R. § 41.208(b), which places burden upon moving party.

September 14, 1992 U.S. filing date. Rather, Hertzog relies upon the '135 certificate, which is directed to a different invention than that presently claimed. Hertzog also relies upon a letter and articles written by Dr. Zakoshansky that are years after the fact and it is unclear whether the processes referred to in the letter and articles are the same as that presently claimed, i.e., Hertzog fails to establish that the GE and Russian phenol plants employ Zakoshansky's presently claimed processes. At best, Hertzog's evidence raises potential concerns regarding Dr. Zakoshansky's identification of the "three-level" system as a preferred control system for industrial-scale CHP decompositions in the early 90's, but these concerns do not rise to the level of a preponderance of the evidence. Considering all the evidence presented by Hertzog collectively, Hertzog fails to demonstrate that Dr. Zakoshansky possessed a subjective belief, at the time of filing, that a computer system was the best mode for practicing the presently claimed subject matter.

Hertzog fails to demonstrate that Zakoshansky's claims require the presence of a computer control system. Further, Hertzog fails to demonstrate that Dr. Zakoshansky, at the time the underlying application was filed, believed that a computer control system was the best mode of practicing the claimed invention, which is not limited to industrial-scale CHP decomposition processes. Hertzog Preliminary Motion 3 is *denied*.

5. Observation

We note Zakoshansky's allegation that:

The disclosure of a control system is not necessary or crucial to the practice of CHP decomposition processes because such processes have existed for decades and persons skilled in the art know how to design control systems for them.

(Paper No. 54, ¶ 115, citing cross-examination testimony of Dr. Levy).

Under cross-examination, Dr. Levy was asked whether or not the Sifniades patent discloses a control system. (ZX 2026, pp. 75-76). Dr. Levy answered that Sifniades did not identify such a control but that CHP decomposition plants had been running for 20 years at the time of the Sifniades patent (1982) and that one knowledgeable in the art would know how to control them. (*Id.*). We credit Dr. Levy's cross-examination testimony and find that control systems were known in the art and that additional disclosure by either Sifniades or Zakoshansky was not required in order to practice a non-isothermal, CHP decomposition process having a first stage CHP decomposition and a second-stage DCP decomposition. *Cf., High Concrete Structures Inc. v. New Enterprise Stone and Lime Co.*, 377 F.3d 1379, 1383, 71 USPQ2d 1948, 1951 (Fed. Cir. 2004) (Best mode requirement "not violated by unintentional omission of information that would be readily known to persons in the field of the invention."); *Robotic Vision Systems, Inc. v. View Engineering, Inc.*, 112 F.3d 1163, 1166, 42 USPQ2d 1619, 1622 (Fed. Cir. 1997) (No best mode violation because disclosure of computer software was "implicit in the specification" and would be apparent to a person skilled in the art).

F. Zakoshansky and Hertzog's Responsive Preliminary Motions to Add and Amend Claims

Both Zakoshansky and Hertzog have filed responsive motions seeking to add or amend claims. Zakoshansky Preliminary Motion 8 (Paper No. 51) is said to be responsive to Hertzog Preliminary Motions 1-3, which allege that Zakoshansky's involved claims are unpatentable. Hertzog Preliminary Motion 6 (Paper No. 47) is said to be responsive to Zakoshansky

Preliminary Motion 2, which alleges that certain Hertzog claims lack written description support. The responsive motions, Zakoshansky Preliminary Motion 8 and Hertzog Preliminary Motion 6, are denied for failing to show the patentability of the proposed additional or amended claims.

1. Show the Patentability of a Claim

When a party files a motion alleging that an opponent's claim is unpatentable, the opponent may respond by filing a motion to redefine the interfering subject matter, such as adding or amending a claim. 37 C.F.R. §§1.633(c) and (i).³⁸ Rule 637 requires that a moving party "show the patentability" to the applicant for each claim proposed to be amended or added. 37 C.F.R. §1.637(c)(2)(iii).³⁹

In 1998 the Board noted that to "show the patentability" of a claim led to some confusion as to what was required to comply with the rules. To alleviate this confusion, the then Chief Administrative Judge of the Board published an Official Gazette Notice that explained the meaning of "show the patentability." Notice of the Chief Administrative Patent Judge of Nov. 6, 1998, "Interference Practice -- Interference Rules Which Require a Party to 'Show the Patentability' of a Claim," 1217 Off. Gaz. Pat. & Tm. Office 17 (Dec. 1, 1998). As stated in the Official Gazette:

The requirement that a party "show the patentability" of a claim should not be construed as requiring a party to prove a negative, i.e., that there is no prior art which would anticipate the claim under 35 U.S.C. § 102 or render the claim

³⁸See new rule 37 C.F.R. §41.208 (Content of substantive and responsive motions).

³⁹See new rule 37 C.F.R. §41.208(c)(1).

unpatentable under 35 U.S.C. § 103. In this respect, the burden of establishing that a claim is not patentable generally falls on the party or individual alleging unpatentability. [citation omitted]. Consistent with 37 CFR § 1.601, which provides that the rules should be construed to secure the just, speedy and inexpensive determination of interferences, the rules requiring a party to “show the patentability” of a claim normally should be interpreted as requiring that a party establish that the subject matter of the claim is described in the specification in the manner required by the first paragraph of 35 U.S.C. § 112.

* * *

An exception would be a situation where a party files a preliminary motion under 37 CFR § 1.633(I) in response to an opponent’s preliminary motion under 37 CFR § 1.633(a) for judgment. Since the party knows the basis for the opponent’s preliminary motion for judgment, the party should also “show the patentability” of the claims proposed to be added by the preliminary motion under 37 CFR § 1.633(I) vis-a-vis the opponent’s basis in the preliminary motion under 37 CFR § 1.633(a). Compare 37 CFR § 1.111(c) and 1.119.

The precise basis upon which a party is required to “show the patentability” necessarily will vary on a case-by-case basis.

(*Id.*).

The Board’s practice of requiring a party to provide specific reasons distinguishing a proposed new or amended claim over a known allegation of unpatentability is similar to filing a response to an office action in *ex parte* prosecution. Indeed, the Chief Judge’s Official Gazette Notice directs attention to Rule 111(c), which relates to responses to a non-final rejection in *ex parte* prosecution. Rule 111(c) provides that:

In amending in reply to a rejection of claims in an application or patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.

37 C.F.R. § 1.111(c). Thus, as with *ex parte* practice, a mere allegation that a proposed claim is patentable over known prior art is insufficient to distinguish that art. *Cf.*, 37 C.F.R. § 1.111(b).

The practice of requiring a party to distinguish known unpatentability allegations is not limited to situations where a party seeks to amend or add a new claim. For example, in *Louis v. Okada*⁴⁰ the Trial Section of the Board held that a party moving to broaden a count was responsible for discussing and distinguishing prior art that had been previously and successfully applied against the broadened subject matter.

2. Zakoshansky Preliminary Motion 8

Zakoshansky Preliminary Motion 8 seeks to add new claims 42 to 45 and amend claims 16, 27, 28 and 40 in response to Hertzog Preliminary Motions 1, 2 and 3. (Paper No. 51, p. 1). Responding to Hertzog's best mode allegations, Zakoshansky states that proposed amended claims 16, 27, 28 and 40 point out how the claimed subject matter is directed to improvements that make the processes more controllable. (*Id.* at 2). As to Hertzog's prior art allegations, Zakoshansky states that proposed new claims 42-45 "emphasize features of Zakoshansky's claimed invention and further distinguish Zakoshansky's claimed invention from Hertzog's § 102(d) references and from the prior art." (*Id.* at 3-4).

As discussed above with respect to Hertzog Preliminary Motion 1, unamended Zakoshansky claim 27 relates to a method where (a) CHP is decomposed in the presence of 10 to 18 wt% cumene at a specific acidic catalyst concentration and temperature and the (b) products

⁴⁰59 USPQ2d 1073 (Bd. Pat. App. & Int. 2001).

are transferred to a plug flow reactor where DCP is decomposed in the presence of a weaker acidic acid catalyst medium and higher temperature than the CHP decomposition whereby the DCP reaction is better controlled. Dr. Zakoshansky's Reissue Declaration identifies the '937 certificate as teaching each of these limitations with the exception of the 10-18 wt% cumene. (HX 1011, ¶¶ 32-33). Based upon the evidence we concluded that unamended claim 27 was obvious as Sifniades teaches the use of technical CHP having about 13% cumene for a CHP decomposition process and Dr. Levy provides credible testimony that one skilled in the art desiring a more controllable reaction would employ the technical CHP of Sifniades as the technical cumene in the CHP decomposition method described in the '937 certificate.

Zakoshansky Preliminary Motion 8 proposes to amend claim 27 to replace the phrase "better controlled" with the phrase "more controllable." (Paper No. 51 at 3). We are uncertain as to why the phrase "more controllable" distinguishes over the prior art any differently than the phrase "better controlled."

Zakoshansky, as moving party, bears the burden of proving that it is entitled to the relief requested. In requesting that claims be amended or added to its involved application, Zakoshansky bears the burden of "showing the patentability" of the proposed amended and added claims. While Zakoshansky provides specific citations to its specification to demonstrate that its proposed amendment complies with the written description requirement, Zakoshansky does not identify with specificity how the amended and added claims distinguish over the known prior art, *e.g.*, Zakoshansky's certificates, Sifniades and Messina. As evident from our consideration of Zakoshansky's proposed amended claim 27, we are uncertain as to whether or not the proposed

amended and added claims distinguish over the known prior art. Zakoshansky Preliminary Motion 8 fails to “show the patentability” of the proposed amendment over the known prior art and, therefore, is *denied*.

3. Hertzog Preliminary Motion 6

Hertzog Preliminary Motion 6 contingently requests the addition of new claims 44 to 50 to Hertzog’s involved application. (Paper No. 47, p. 1). The preliminary motion is contingent upon the grant of Zakoshansky Preliminary Motion 2, which requests judgment against certain Hertzog claims due to an alleged lack of written description. As Zakoshansky Preliminary Motion 2 was granted-in-part, Hertzog Preliminary Motion 6 is ripe for consideration.

Proposed new claims 44 to 50 are all directed to “improved methods” where claims 44 and 48 to 50 are independent claims and claims 45 to 47 depend from claim 44. For example, proposed new claim 44 reads as follows:

44. An improved method for the multiple-stage decomposition of a cumene oxidation product mixture comprising cumene hydroperoxide and dimethylphenyl carbinol to produce phenol, acetone and alpha methylstyrene, wherein the improvement comprises,

in a first stage, decomposing technical cumene hydroperoxide in a continuous manner in a circulation loop comprising a series of decomposition reactors in the presence of an acidic catalyst, cumene and excess acetone in an amount from 10 to 100 percent excess acetone relative to the amount of acetone produced;

whereby the yield of alpha methylstyrene is increased, safety of operation is enhanced and the stability of the reaction is increased.

(Paper No. 47, Appendix A).

We note Hertzog claim 44 concludes with the recitation that “whereby the yield of alpha methylstyrene is increased, safety of operation is enhanced and the stability of the reaction is increased.” Hertzog Preliminary Motion 6 identifies these limitations as described on page 4 of Hertzog’s involved ‘190 application. Page 4 of Hertzog ‘190 provides a “Summary of the Invention” and describes the addition of excess acetone to the CHP product as allowing for higher AMS yields, improved safety and stability.

Hertzog Preliminary Motion 6 does not identify with specificity how its proposed new claims distinguish over the known prior art. For instance, as with proposed claim 44, Sifniades describes a multi-stage CHP decomposition process where CHP is decomposed in the presence of an acid catalyst and the decomposition product, which contains DCP, then is sent to a separate reactor where the DCP is decomposed and phenol, acetone and AMS is formed. (HX abstract, col. 2, lines 19-54 and col. 5, lines 1-47). Messina also concerns CHP decomposition processes and directs one skilled in the art to employ excess acetone to improve AMS yields in a CHP decomposition process. (Messina, ZX 2007, p. 12). Messina specifically describes the use of 59 % excess acetone, which corresponds to a phenol/acetone ratio of 0.63 and an acetone to phenol ratio of 1.59:1. (ZX 2007, Fig. 4, p. 13). Regarding recycling of acetone, Sifniades describes recovering the various components by distillation (HX 1004, col. 5, lines 46-47) and we have credited the testimony of Zakoshansky’s expert, Mr. Fulmer that:

It was therefore the suitable and obvious means for obtaining acetone, which could be recycled to the decomposition reactor for the purpose of increasing acetone content in this reactor. It would not matter if the evaporated acetone also contained some of the other CHP decomposition products because all of these other components were already present in the CHP decomposition reactor.

(*Id.* at 113).

Hertzog, as moving party, bears the burden of proving that it is entitled to the relief requested. In requesting that the proposed claims be added to its involved '190 application, Hertzog bears the burden of "showing the patentability" of these proposed claims. As with Zakoshansky, Hertzog identifies where the proposed claims allegedly are described in its involved application but does not provide specific arguments as to how the proposed claims distinguish over the known prior art, *e.g.*, Sifniades and Messina. As should be evident from our discussion of Hertzog's proposed claim 44, we are uncertain whether or not Hertzog's proposed claims are patentable over the known prior art. Hertzog Preliminary Motion 6 fails to "show the patentability" of the proposed amendment over the known prior art and, therefore, is *denied*.

G. Lack of Interfering Subject Matter as Between the Parties' Remaining Claims

Many of the parties claims have been held unpatentable. For convenience, a chart summarizing the status of the parties claims is provided below.

Status of Zakoshansky and Hertzog Claims			
Party	Involved Claims	Unpatentable	Remaining Claims
Hertzog '190	7-43	7-8, 10-29, 31-37, 39-41 and 43	9, 30, 38 and 42
Zakoshansky '092	1-31 and 33-41	1-4, 6-11, 21-27, 29-31, 33-41	5, 12-20, and 28

Zakoshansky has failed to demonstrate that Hertzog claims 9, 30, 38 and 42 are unpatentable. Each of these claims is a dependent claim that further limits a method of

decomposing CHP. The claims require a cumene oxidation product feed that contains 81.6 wt% CHP, 5 wt% DMPC and 0.4 wt% acetophenone, the balance being mostly cumene. The claims also require that the decomposition process employs an acetone solution recycle stream containing 0.86% AMS, 2.06 wt% phenol, 5.83 wt% cumene, 1.6 wt% water and 0.0512 wt% sulfuric acid. Additionally, the claims require that the cumene oxidation product feed stream be continuously introduced into the CHP reactor at a rate of 1.62 parts by weight per minute and that the acetone solution recycle stream be added to the CHP reactor at a rate of 0.23 parts by weight per minute. Of note, Zakoshansky has failed to demonstrate that the particularly claimed amounts and feed stream rates would have been obvious to one of ordinary skill in the art.

Hertzog has failed to demonstrate that Zakoshansky claims 5, 12-20, and 28 are unpatentable. Zakoshansky claim 5 is a dependent claim directed to a process of decomposing CHP in a multiplicity of separate sequential reactors where the temperature of the reactions among the three sequentially placed reactors is about 50° to 62° C. in the first reactor, about 62° to 57° C. in the second, and about 57° to 50° C. in a third reactor. Hertzog failed to demonstrate that one skilled in the art would be motivated to select the specifically claimed temperature ranges for the three sequential CHP reactors.

Zakoshansky claims 12-20 generally require a method of decomposing CHP in the presence of excess acetone and decomposing DCP in the presence of the reaction product of an amine and an acidic catalyst. Zakoshansky claim 28 is an improved method that, among other things, requires a CHP decomposition and a DCP decomposition with a weaker acidic catalyst medium used in the DCP decomposition. Generally, Hertzog failed to demonstrate that one

skilled in the art would employ and acidic catalyst and excess acetone in the CHP decomposition process and then conducting a DCP decomposition where the acidic catalyst was weaker than in the CHP decomposition, *e.g.*, partially neutralized with an amine.

1. Requirements for an Interference-in-Fact

Under 35 U.S.C. §135(a), the Director of the USPTO is authorized to declare interferences between an application for patent and any pending application or any unexpired patent. The USPTO interference rules provide that:

An interference-in-fact exists when at least one claim of a party that is designated to correspond to a count and at least one claim of an opponent that is designated to correspond to the count define the same patentable invention.

37 C.F.R. §1.601(j). The rules define “same patentable invention” and “separate patentable invention” as:

Invention “A” is the same patentable invention as an invention “B” when invention “A” is the same as (35 U.S.C. 102) or is obvious (35 U.S.C. 103) in view of invention “B” assuming invention “B” is prior art with respect to invention “A”. Invention “A” is a separate patentable invention with respect to invention “B” when invention “A” is new (35 U.S.C. 102) and non-obvious (35 U.S.C. 103) in view of invention “B” assuming invention “B” is prior art with respect to invention “A”.

37 C.F.R. §1.601(n).⁴¹

⁴¹New rule 37 C.F.R. §41.203 provides that:

An interference exists if the subject matter of a claim of one party would, if prior art, have anticipated or rendered obvious the subject matter of a claim of the opposing party and vice versa.

Under the rules as interpreted by the Director, an interference-in-fact is established when the parties are claiming the same patentable invention. To determine whether the parties are claiming the same patentable invention, the Director applies a two-way test. This two-way test involves: 1) comparing Party A's claims with Party B's claims, assuming that Party B is prior art to A; and 2) comparing Party B's claims with Party A's claims, assuming that Party A is prior art to B. Employing this analysis, there is an interference-in-fact if: 1) Party A's claims anticipate or render obvious Party B's claims; and, 2) Party B's claims anticipate or render obvious Party A's claims. This test has been upheld by the Federal Circuit as:

[T]he Director's two-way test avoids the proliferation of unnecessary, wasteful interference proceedings concluding that both parties are entitled to patents in situations in which the claimed inventions do not define the same patentable invention, but merely overlap in scope. This is the clear application of discretion that is inherent in the authority granted pursuant to 35 U.S.C. § 135(a) of the statute.

Eli Lilly v. Bd. of Regents of the Univ. of Wash., 334 F.3d 1264, 1268, 67 USPQ2d 1161, 1164 (Fed. Cir. 2003).

While a two-way patentability test is needed to demonstrate the existence of an interference-in-fact, a failure of the two-way test in either direction, i.e., A's claims fail to anticipate or render obvious B's claims or vice-versa, is sufficient to demonstrate that there is no interference-in-fact between the parties. This one-way distinctiveness for no interference-in-fact is a natural consequence of the two-way test for the existence of an interference-in-fact. See, *Noelle v. Lederman*, 355 F.3d 1343, 1351, 69 USPQ2d 1508, 1515 (Fed. Cir. 2004).

In determining whether there is an interference-in-fact, the Board compares each party's claimed inventions. As discussed in *Noelle*:

A patentee's invention is only found in a patentee's claims, unless the patentee uses sufficient means-plus-function language to invoke 35 U.S.C. § 112, paragraph (6). Thus, if the Board is to compare two inventions, the Board must only compare the parties' claims.

Id. at 1516. Thus, while the Board will interpret a party's claims in light of its specification, the Board will not rely upon a party's specification as prior art in conducting the test for an interference-in-fact.

2. Hertzog and Zakoshansky's Remaining Claims Do Not Interfere-in-Fact

Generally, an examiner will recommend that the Director declare an interference where the examiner is of the opinion that a question of priority of invention exists between two parties claiming the same patentable subject matter such that two patents on the claimed subject matter should not exist. An Administrative Patent Judge, acting on behalf of the Director, reviews this recommendation and will declare an interference where the record is sufficient to establish its existence. 37 C.F.R. § 41.203.

The record has changed substantially since the examiner recommended that an interference be declared. Numerous claims of both parties have been held unpatentable and it is unclear from this record that an interference-in-fact exists between the remaining potentially patentable claims. Accordingly, we review the parties' remaining claims to determine whether or not the record is sufficient to establish the existence of interfering subject matter as between the parties' remaining claims.

As discussed above, Hertzog claims 9, 30, 38 and 42 have not been shown to be unpatentable and require specific reactant proportions and feed stream rates. Zakoshansky

Preliminary Motions 1 and 3 attempted to show that Hertzog's specific proportions and feed stream rates were not patentable because Hertzog had failed to provide data otherwise. (Paper No. 40, Appendix 8). As is apparent from Zakoshansky's attempted burden shift, the evidence of record is insufficient to demonstrate that the claimed proportions and stream rates would have been obvious to one of ordinary skill in the art. Further, providing one skilled in the art with Zakoshansky's claims would not have motivated or suggested the particularly claimed proportions and feed rates. Zakoshansky's remaining claims do not identify: 1) a particular amount of DMPC or acetophenone in a CHP feed stream; 2) a particular amount of AMS, phenol, or cumene in an acetone recycle stream; or 3) suggest the selection of the specifically recited proportions and feed stream rates recited in Hertzog's claims.

An interference-in-fact requires that, taken in light of the prior art, Zakoshansky's remaining claims, anticipate or render obvious Hertzog's remaining claims and vice-versa. Zakoshansky's remaining claims, taken in light of the prior art fail to teach or suggest the particularly claimed subject matter of Hertzog's remaining claims. As the parties' remaining claims are not directed to interfering subject matter, there is no longer an interference-in-fact between the parties.

While we have determined that the parties' remaining claims have not been shown to be unpatentable on the arguments and evidence presented in this interference, we recommend that the examiner(s) of the involved applications review the interference record and consider taking any action deemed necessary to ensure the patentability of the parties' remaining claims.

Additionally, our decision of no interference-in-fact is without prejudice to an examiner independently reviewing the remaining claims and recommend, based upon new grounds, which may or may not be provided by the parties, that the Board declare a new interference.⁴²

H. The Parties' Preliminary Motions to Undesignate Claims, Substitute a Proposed Count and be Accorded Earlier Benefit Dates for Proposed Counts are Moot

Zakoshansky has filed preliminary motions that seek to undesignate Zakoshansky's claims (Zak. Prel. Mot. 6), substitute a proposed count (Zak. Prel. Mot. 5) and requesting section 102(g) priority benefit of an earlier filing date for the proposed count (Zak. Prel. Mot. 7). Similarly, Hertzog has filed a preliminary motion that seeks to substitute a new count (Hertzog Prel. Mot. 4), as well as requesting section 102(g) priority benefit of an earlier filing date for the Hertzog's and Zakoshansky's proposed counts (Hertzog Prel. Mot. 4 and 7). These motions are discussed below.

1. Zakoshansky Preliminary Motion 6 to Undesignate Claims

Zakoshansky Preliminary Motion 6 seeks to undesignate Zakoshansky claims 11-20 and 22-29 as not corresponding to any count in the interference. (Paper No. 43, p. 1). According to Zakoshansky, the claims to be undesignated relate to a CHP decomposition process having a DCP reaction that is carried out using milder conditions than the prior art. The milder conditions

⁴²We recognize that the time for submitting additional evidence as to the obviousness of an opponent's claims has passed. Our decision of no interference-in-fact is without prejudice to the parties providing additional arguments and evidence during *ex parte* prosecution as to why each parties claims are unpatentable over its opponents.

include a lower temperature range and decreasing the quantity of strong acidic catalyst present by adding an amine. (*Id.* at pp. 1-2). Zakoshansky's expert, Mr. Fulmer, testifies that Sifniades and Hertzog do not take steps to lower the concentration of the strong acid catalyst in the subsequent DCP reaction and that such steps would not have been obvious to a person of ordinary skill in the art. (ZX 2001, ¶¶ 174, 183).

Hertzog opposes the undesignation of these claims alleging that they are obvious over Hertzog's claims. (Paper No. 65, p. 13). Hertzog alleges that the use of a partially neutralized acidic catalyst would be obvious because the resulting acid concentrations that result from the partial neutralization overlap Hertzog's claimed acid concentrations. (*Id.*). Hertzog also alleges that Zakoshansky's claimed temperatures and acid concentrations are "mere optimizations or overlapping parameters." (*Id.*).

Zakoshansky claims 11, 27 and 29 have already been held unpatentable to Zakoshansky, and as such, Zakoshansky's request to undesignate these three claims is moot. Further, with respect to the remaining claims 12-20, and 28, since there is no longer an interference between the parties the issue of claim correspondence is moot, *i.e.*, there is no count that defines the interfering subject matter as between the parties from which to undesignate the claims. We conclude that Zakoshansky Preliminary Motion 6 is dismissed as *moot*.

2. Zakoshansky Preliminary Motion 5 to Substitute Counts

Zakoshansky Preliminary Motion 5 seeks to substitute proposed Counts 1A, 1B and 1C for existing Counts 1 and 3 and substitute proposed count 2A for Count 2. (Paper No. 42, p. 1).

Zakoshansky Preliminary Motion 5 is contingent upon the denial of Zakoshansky Preliminary Motions 1-3, which request that Herzog's claims be held unpatentable over prior art and a lack of sufficient written descriptive support and were granted-in-part. (*Id.*). Zakoshansky states that by granting Zakoshansky Preliminary Motion 5, all of Hertzog's pending claims would correspond to the counts whereas only Zakoshansky claims 1-10, 21, 30-31 and 33-41 would correspond. (*Id.*). Hertzog opposes Zakoshansky's proposed substitute counts. (Paper No. 64).

A count defines the interfering subject matter as between the parties. 37 C.F.R. §1.601(f).⁴³ On the record presented, the parties' remaining claims do not define interfering subject matter and there is no interference-in-fact. Zakoshansky Preliminary Motion 5, which seeks to substitute counts, is dismissed as *moot*.

3. Zakoshansky Preliminary Motion 7 Seeking Earlier Accorded Benefit Date for Zakoshansky's Proposed Substitute Counts

Zakoshansky Preliminary Motion 7 requests that Zakoshansky be accorded benefit of the September 14, 1992 filing date of Zakoshansky's U.S. Application 07/944,688 for Zakoshansky's proposed substitute counts 1A, 2A and 3A. (Paper No. 44, p. 1). This preliminary motion is contingent upon the grant of Zakoshansky Preliminary Motion 5, which requests the substitution of counts. As Zakoshansky Preliminary Motion 5 is dismissed as *moot*, Zakoshansky Preliminary Motion 7 is likewise dismissed as *moot*.

⁴³See new rule 37 C.F.R. §41.201.

4. Hertzog Preliminary Motion 7 Seeking Earlier Accorded Benefit Date for Zakoshansky's Proposed Substitute Counts

Hertzog Preliminary Motion 7 requests that Hertzog be accorded benefit of the January 17, 1989 filing date of U.S. Application 07/297,333 for Zakoshansky proposed Counts 1A, 2A and 3A. (Paper No. 48, p. 1). This motion is contingent on the grant of Zakoshansky Preliminary Motion 5. (*Id.*). As Zakoshansky Preliminary Motion 5 is dismissed as moot, Hertzog Preliminary Motion 7 is likewise dismissed as *moot*.

5. Hertzog Preliminary Motion 4 to Substitute Counts

Hertzog Preliminary Motion 4 seeks to substitute a proposed Count 4 for Count 1. (Paper No. 33, p. 1). This motion is contingent upon a finding that "some portion of Zakoshansky's claims are patentable." (*Id.*). Hertzog's proposed Count 4 is a combination of Hertzog claims 7, 8 and 26. (*Id.*). Zakoshansky opposes. (Paper No. 55).

A count defines the interfering subject matter as between the parties. 37 C.F.R. §1.601(f).⁴⁴ On the record presented, the parties' remaining claims do not define interfering subject matter and there is no interference-in-fact. Hertzog Preliminary Motion 4, which seeks to substitute a count, is dismissed as *moot*.

6. Hertzog Preliminary Motion 5

⁴⁴See new rule 37 C.F.R. §41.201.

Hertzog Preliminary Motion 5 requests that Hertzog be accorded benefit of the filing date of U.S. Application 07/297,333, filed January 17, 1989 for Hertzog proposed Count 4. This motion is contingent on the grant of Hertzog Preliminary Motion 4. As Hertzog Preliminary Motion 4 is dismissed as moot, Hertzog Preliminary Motion 5 is likewise dismissed as *moot*.

I. Hertzog's Miscellaneous Motion to Suppress Zakoshansky Evidence

Hertzog requests that a substantial number of exhibits be suppressed and that the Board disregard the suppressed evidence in rendering its decision. (Hertzog Misc. Mot. 1, Paper No. 90, pp. 1-2). Hertzog provides several reasons as to why certain Zakoshansky's exhibits should be excluded including lack of relevance and hearsay. Hertzog also requests that Zakoshansky's replies should be returned as they allegedly raise new issues. Zakoshansky opposes Hertzog's requests. (Zak. Op., Paper No. 92).

1. Hertzog's Failure to Timely File its Objections to Zakoshansky's Exhibits

Interferences are time consuming and resource intensive, for both the parties and the Board. To reduce the burden upon all involved, the Board has adopted a procedure in which a party may object to evidence and in response, an opposing party may provide supplemental evidence seeking to cure the alleged defect(s). The procedure is set forth in the Standing Order which states that "any" objection to the admissibility of evidence shall be served within five (5) business days of the service of the objectionable evidence. (Paper No. 2, ¶ 33). A party whose evidence is objected to may file responsive supplemental evidence to cure the alleged

deficiencies. (Paper No. 2, ¶ 33). Among other things, by allowing a party to cure the alleged defects, the Board reduces the number of evidentiary questions that must be ultimately ruled upon.

Hertzog did not provide a timely objection to Zakoshansky's exhibits. (Paper No. 92, ¶ 37, admitted by Hertzog, Paper No. 93). Hertzog's miscellaneous motion does not identify why the specific objections to the admissibility of the evidence, *e.g.*, hearsay and relevance, could not have been raised earlier. Hertzog's current objection that Zakoshansky's exhibits are defective and fail to comply with the Federal Rules of Evidence is not timely within the meaning of Section 33 of the Standing Order.

2. Hertzog Fails to Demonstrate that Zakoshansky's Replies Belatedly Rely Upon Evidence that Should Have Been Presented Earlier

Paragraph 31 of the Standing Order provides that no new issues shall be raised in the replies and indicates that "new issues" include new evidence in a reply brief that is necessary to make out a prima facie case for the requested relief. (Standing Order, Paper No. 2, § 31). Hertzog alleges that Zakoshansky's replies relied upon exhibits that should have been provided earlier and these exhibits raise new issues in violation of the Standing Order. The disputed Zakoshansky exhibits are discussed in detail below.

ZX 2010 (U.S. Patent No. 2,904,592)
ZX 2012 (British Patent No. 1,202,687)
ZX 2013 (U.S. Patent No. 4,246,203)

Zakoshansky exhibit 2010 is U.S. Patent No. 2,904,592. Zakoshansky exhibit 2012 is British Patent No. 1,202,687. Zakoshansky exhibit 2013 is U.S. Patent No. 4,246,203. Hertzog alleges that these exhibits were relied upon in Zakoshansky Replies 1 and 3 for the proposition that excess acetone is not detrimental to the CHP cleavage reaction. (Paper No. 90, ¶ 5). Hertzog argues that these exhibits raises new issues that could have been raised in Zakoshansky's motions.

Zakoshansky Preliminary Motions 1 and 3 allege that it would have been obvious to one of ordinary skill in the art to employ excess acetone in the CHP cleavage process of Sifniades to enhance AMS yield. (*See, e.g.*, Paper No. 46, p. 21, which cites Fulmer Dec., ZX 2001, ¶ 98). Hertzog opposed Zakoshansky Preliminary Motions 1 and 3 alleging that:

In the early 1980's those skilled in the art of the two-stage process for decomposition of cumene hydroperoxide ("CHP") believed that the use of excess acetone in the first stage of the process would reduced the yield of alpha methylstyrene ("AMS") and increase the amount of unusable tars.

(Hertzog Op. 1, p. 1; Hertzog Op. 3, p. 1). Zakoshansky replies 1 and 3 relied upon a third declaration of Mr. Fulmer (ZX 2030), which in turn relied upon several exhibits, including ZX 2010, 2012 and 2013, to support its contention that it was known in the art to use excess acetone to provide a molar excess of acetone in a CHP decomposition process and that the excess acetone was not detrimental to the process. (*See, e.g.*, Zak. Reply 1, ¶ 86 and ZX 2030, ¶¶ 72-78).

Based upon the record presented, we conclude that Mr. Fulmer's Third Declaration and ZX 2010, 2012 and 2013 were filed in response to Hertzog's allegations that one skilled in the art would not have employed excess acetone in a two-stage CHP process and do not raise new issues that should have been presented earlier.

ZX 2031-2042

Zakoshansky exhibits 2031 through 2042 are prior art U.S. patents and articles that generally relate to the CHP decomposition process. Hertzog alleges that Zakoshansky first relied upon these exhibits in Zakoshansky Replies 1 and 3 but that these exhibits could have been included with the preliminary motions. (Paper No. 90, ¶ 10). According to Hertzog, these exhibits were relied upon in the replies for the first time to:

[S]how a motivation to combine the teachings of Sifniades and Messina, which is part of the *prima facie* case that Zakoshansky was required to make out in his Preliminary Motions 1 and 3.

(*Id.* at ¶ 10).

Zakoshansky Preliminary Motions 1 and 3 specifically state that “[t]o one who wanted to enhance the yield of AMS, the combination of Sifniades and Messina would have been an obvious choice” and direct the Board’s attention to the supporting testimony of Mr. Fulmer (ZX 2001). (See, *e.g.*, Paper No. 46, p. 21). We conclude that Zakoshansky Preliminary Motions 1 and 3 provide motivation as to why one skilled in the art would combine the teachings of Sifniades and Messina - improved AMS yields.

Zakoshansky Replies 1 and 3 cite paragraphs 9 and 72-78 of Mr. Fulmer’s Third Declaration to rebut Hertzog’s contention that there was no reasonable expectation of success to combine the teachings of Sifniades and Messina. (See, *e.g.*, Paper No. 71, ¶ 86). Mr. Fulmer’s declaration paragraphs 9 and 72-78 discuss the known use of excess acetone in an acid-catalyzed CHP decomposition process and was presented to rebut Hertzog’s alleged lack of a reasonable expectation of success for adding acetone to a CHP decomposition. Mr. Fulmer supports his

position by relying, in part, upon ZX 2031 through 2041. (ZX 2030, ¶ 76).

Based upon the record presented, we conclude that Mr. Fulmer's Third Declaration and ZX 2031 through 2041 were filed in response to Hertzog's allegations that one skilled in the art would not have had a reasonable expectation of success for using the excess acetone of Messina in the CHP decomposition of Sifniades do not raise new issues that should have been presented earlier.

ZX 2043-2046 and 2050-2051

Zakoshansky exhibits 2043-2046 and 2050-2051 "illustrate the basic chemistry that is common to all CHP decomposition processes." (Paper No. 90, p. 13). According to Hertzog, these exhibits could have been included in Zakoshansky Preliminary Motions 1 and 3 and their use for the first time in Zakoshansky Replies 1 and 3 constitutes a new issue. (*Id.*).

Hertzog fails to demonstrate that the use of ZX 2043-2046 and 2050-2051 constitutes a new issue in Zakoshansky's replies. Zakoshansky Preliminary Motions 1 and 3 specifically address the chemistry involved in this interference and the illustration of the chemistry in the replies fails to rise to the level of a "new" issue, *i.e.*, ZX 2043-2046 and 2050-2051 are at most cumulative to the evidence presented in Zakoshansky Preliminary Motions 1 and 3.

ZX 2053-2054

Zakoshansky exhibits 2053 and 2054 provide information regarding a UOP phenol process. Hertzog states that these exhibits were relied upon in Zakoshansky's replies 2, 4, 5 and

6 in an attempt to establish that Hertzog lacks enablement and/or written descriptive support for his claimed improvement in safety and control. (Paper No. 90, p. 14).

Zakoshansky Preliminary Motions 5 and 6 were dismissed as moot. Zakoshansky Preliminary Motion 4, which alleges a lack of enablement for Hertzog's claims, was denied. Zakoshansky Preliminary Motion 2, which alleges a lack of written description for Hertzog claims, was granted as to Hertzog claims 26, 31 and 32 and denied with respect to Hertzog claims 8-13, 15-25, 33-35, 37-38 and 40-42. Hertzog claims 26 and 31 lack written descriptive support for Hertzog's claimed DCP reaction temperatures and Hertzog claim 32 lacks written descriptive support for Hertzog's claimed back-mixed reactor outlet stream.

Hertzog's request to strike Zakoshansky Replies 2, 4, 5 and 6 is dismissed as moot as none of underlying motions were granted with respect to the issues raised by the presence of ZX 2053-2054.

ZX 2030

Zakoshansky exhibit 2030 is the Third Declaration of Mr. Fulmer. Hertzog alleges that declaration paragraphs 9(a)-(c), 72, 76(a)-(j), 82, 126, 187, 194 and 231 should be suppressed as they rely on exhibits that should be suppressed. As the exhibits relied upon in these paragraphs were not suppressed, Hertzog's request to suppress the particular paragraphs of Mr. Fulmer's Third Declaration is denied.

3. Second Declaration of Mr. Fulmer (ZX 2023)

Hertzog alleges that the second declaration of Mr. Fulmer contains testimony that is not entirely consistent with the testimony provided by Dr. Zakoshansky in his reissue declaration. (Paper No. 90, p. 16). Hertzog requests that paragraphs 30, 36, 43, 44, 75, 97, 98, 99, 102, 106, 130, 132, 133, 143, 144, 146, 147, 156, 158, 159 and 162 of Mr. Fulmer's second declaration be suppressed. (*Id.*).

Where there is conflicting testimony, the conflict goes to the weight of the evidence rather than to its admissibility. Hertzog's request to suppress the identified paragraphs of Mr. Fulmer's second declaration is denied.

Hertzog Miscellaneous Motion 1 has been considered. As discussed above, the motion is *denied-in-part* and dismissed-in-part as *moot*.

IV. ORDER

Based upon the evidence identified in the record, it is:

ORDERED that Zakoshansky Preliminary Motion 1, requesting that Hertzog claims 7, 14, 26-31, 36, 39 and 43 be held unpatentable over prior art, is *granted* with respect to Hertzog claims 7, 14, 26-29, 31, 36 and 43 and *denied* with respect to claims 30 and 39.

FURTHER ORDERED that Zakoshansky Preliminary Motion 2, requesting that Hertzog claims 8-13, 15-25, 32-35, 37-38 and 40-42 be held unpatentable for a lack of sufficient written descriptive support, is *granted* with respect to Hertzog claims 26, 31 and 32 and *denied* with respect to claims 8-13, 15-25, 33-35, 37-38 and 40-42.

FURTHER ORDERED that Zakoshansky Preliminary Motion 3, requesting that Hertzog claims 8-13, 15-25, 32-35, 37-38 and 40-42 be held unpatentable over prior art, is *granted* with respect to Hertzog claims 9-13, 15-25, 32-35, 37 and 40-41 and *denied* with respect to claims 8 and 38.

FURTHER ORDERED that we hold that Zakoshansky claims 1-4, 6-10, 21, 30-31, and 37-39 are unpatentable over the prior art relied upon in Zakoshansky Preliminary Motions 1 and 3.

FURTHER ORDERED that Zakoshansky Preliminary Motion 4, requesting that Hertzog claims 7-26, 29-35 and 43 be held unpatentable for a lack of sufficient enabling disclosure in Hertzog's application, is *denied*.

FURTHER ORDERED that Zakoshansky Preliminary Motion 5, which requests the substitution of proposed Counts 1A, 1B and 1C for existing Counts 1 and 3 and substitution of proposed count 2A for Count 2 is dismissed as *moot*.

FURTHER ORDERED that Zakoshansky Preliminary Motion 6, which seeks to undesignate Zakoshansky claims 11-20 and 22-29 as not corresponding to any count in the interference, is dismissed as *moot*.

FURTHER ORDERED that Zakoshansky Preliminary Motion 7, which requests that Zakoshansky be accorded benefit of the September 14, 1992 filing date of Zakoshansky's U.S. Application 07/944,688 for Zakoshansky's proposed substitute counts 1A, 2A and 3A, is dismissed as *moot*.

FURTHER ORDERED that Zakoshansky Preliminary Motion 8, which seeks to add new claims 42 to 45 and amend claims 16, 27, 28 and 40 in response to Hertzog Preliminary Motions 1, 2 and 3, is *denied*.

FURTHER ORDERED that Hertzog Preliminary Motion 1, which requests that Zakoshansky claims 1-20, 27-31, 33-37, and 39-41 be held unpatentable over prior art, is *granted* with respect to Zakoshansky claims 1, 2, 4, 7-9, 11, 27, 29, 33-37 and 40-41 and *denied* with respect to claims 3, 5-6, 10, 12-20, 28, and 30-31 and *moot* with respect to Zakoshansky claim 39.

FURTHER ORDERED that Hertzog Preliminary Motion 2, which requests that Zakoshansky claims 21-26 and 38 be held unpatentable over prior art, is *granted* with respect to claims 22-26 and 38 and *moot* with respect to Zakoshansky claim 21.

FURTHER ORDERED that Hertzog Preliminary Motion 3, which requests that Zakoshansky claims be held unpatentable due to an alleged failure to describe the best mode of carrying out the claimed invention is *denied*.

FURTHER ORDERED that Hertzog Preliminary Motion 4, which requests that a proposed Count 4 be substituted for Count 1, is dismissed as *moot*.

FURTHER ORDERED that Hertzog Preliminary Motion 5, which requests that Hertzog be accorded priority benefit of the January 17, 1989 filing date of U.S. Application 07/297,333 for Hertzog's proposed Count 4, is dismissed as *moot*.

FURTHER ORDERED that Hertzog Preliminary Motion 6, which contingently requests the addition of new claims 44 to 50 to Hertzog's involved application, is *denied*.

FURTHER ORDERED that Hertzog Preliminary Motion 7, which requests that Hertzog be accorded priority benefit of the January 17, 1989 filing date of U.S. Application 07/297,333 for Zakoshansky proposed Counts 1A, 2A and 3A, is dismissed as *moot*.

FURTHER ORDERED that Hertzog Miscellaneous Motion 1, which requests that certain Zakoshansky evidence and/or replies be suppressed, is *denied-in-part* and *moot-in-part*.

FURTHER ORDERED that a copy of this final decision shall be placed and given a paper number in the file of Zakoshansky, U.S. Serial No. 08/545,092 and in the file of Hertzog, et al., U.S. Serial No. 08/865,190.

cc: (via FedEx):

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